Department of Computer Engineering
Bilkent University

Senior Design Project II

Project short-name: VITRINN

Final Report

Bade Timuroğlu, Mert Acarlar, Murat Yavuz, Onur Mimaroğlu, Sinem Alak

Supervisor: İbrahim Körpeoğlu

Jury Members: Uğur Güdükbay and Özgür Ulusoy

Final Report Draft 1

April 24, 2013

This report is submitted to the Department of Computer Engineering of Bilkent University in partial fulfillment of the requirements of the Senior Design Project course CS492.

Table of Contents

Table of Figures 6
1. Introduction 8
2. COMPARISONS WITH THE EXISTING SYSTEMS 9
3. FINAL ARCHITECTURE AND DESIGN 9
3.1. Overview 9
3.2. Subsystem Decomposition 11
3.2.1. Android Application Subsystem 11
3.2.2. Web Services Subsystem 11
3.2.3. Company Subsystem 12
3.2.4. Statistics Manager Subsystem 12
3.2.5. Admin Subsystem 13
3.2.6. Website Subsystem 13
3.2.7. Database Manager 14
3.3. Architectural Patterns 14
3.3.1. Client Server Pattern 14
3.3.2. Singleton Pattern 15
3.3.3. Observer Pattern 15
3.3. Hardware/Software Mapping 16
3.4. Persistent Data Management 18
3.5. Design Decisions 19
3.6.1. Java 19
3.6.2. MySQL 19
3.6.3. PHP 19
3.6.4. JQuery 19
3.6.4. JSON 19
3.6. Class Diagram 20
3.7. User Scenarios 20
3.6.1. Client Scenarios 20
3.6.1.1. Scenarios of the Unregistered Users 20
3.6.1.2. Scenarios of the Logged in Users 22
3.6.1.3. Scenarios of Companies 23
3.6.2. Scenarios of Admin 25
4. TOOLS AND TECHNOLOGIES 25

4.1. The Android Development Tools (ADT) for Eclipse: 25
4.2. HTML5: 25
4.3. PHP: 25
4.4. Java: 25
4.5. JSON: 25
4.6. Apache: 25
4.7. Ajax: 25
4.8. Kendo UI: 25
4.9. Image Magick: 25
4.10. XML: 25
4.11. AmbilWarna: 26
4.12. UniversalImageLoader: 26
4.13. NewQuickAction3D: 26
4.14. MemoryCache Class: 26
4.15. Google Map API: 26
5. RESOURCES USED 27
5.1. Image Magick: Used in Try Page. Used for cropping the users' photos' backgrounds. 27
5.2. JQuery: is a JavaScript class. Used for HTML DOM management. 27
5.3. JQuery UI: Used in Try Page. Used for drag, drop and resize issues of the products' images on users' photos. 27
5.4. HTML to Canvas: Used for taking screenshot of canvas. 27
5.5. Innova Wysiwyg: Used as text editor. 27
5.6. Excel Reader: Is a PHP class, for reading Excel documents. 27
5.7. Google Map API: Used for getting users' current locations and stores' and companies' locations. 27
5.8. Direction API: Used for providing users address descriptions starting from their current locations to the nearest stores' locations. Furthermore, it is used for finding the nearest store that the desired product is sold. 27
6. IMPACT OF ENGINEERING SOLUTIONS 28
6.1. Ethical Issues 28
6.2. Economic Issues 28
6.4. Contemporary Issues 29
7. USER MANUAL & SCREENSHOTS 29
7.1. Customer's User Manual 29

7.1.1. Vitrinn Android Tablet Version 30
7.1.1.1. Loading Page 30
7.1.1.2. Login/Signup Page 31
7.1.1.3. Making a Quick Search 32
7.1.1.3. Home Page 34
7.1.1.4. My Wardrobe Page 35
7.1.1.4. My Favorites Page 36
7.1.1.5. Edit Profile Page 37
7.1.1.6. Advanced Search Page 38
7.1.1.7. Search Results Page 39
7.1.1.8. Detailed Product Page 40
7.1.1.8. Try Product Page 42
7.1.1.9. Sharing a Product 45
7.1.1.10. Get Advice 46
7.1.2. Vitrinn Android Mobile Version 47
7.1.2.1. Login/Signup Page 47
7.1.2.2. Making Searches 48
7.1.2.3. Home Page of a Registered User 48
7.1.2.4. My Wardrobe Page 49
7.1.2.5. My Favorites Page 51
7.1.2.6. Edit Profile Page 52
7.1.2.7. Advanced Search Page 53
7.1.2.8. Search Results Page 54
7.1.1.8. Detailed Product Page 55
7.1.1.9. Get Advice Product Page 57
7.1.1.10. Share Product 58
7.2. Companies' User Manual 59
7.2.1. Opening Page 59
7.2.2. Signup Page 60
8.2.3. Edit Company Profile 61
8.2.4. Edit Company Location 62
8.2.5. Add New Store 63
8.2.6. List Stores 64
8.2.7. Login as a Store 65

8.2.8. Add Product 66
8.2.9. Statistics 68
8. CONCLUSION 70
9. REFERENCES 71

Table of Figures

Figure 1 – Subsystem Decomposition 10
Figure 2- Client Server Pattern 14
Figure 3a- Singleton Pattern 15
Figure 3b- Observer Pattern 16
Figure 4 – Deployment Diagram 17
Figure 5 – E/R Diagram 18
Figure 6 – Class Diagram 20
Figure 6 – Vitrinn Tablet Version Loading Page 31
Figure 7 – Vitrinn Login/Signup Page 31
Figure 8 –Quick Search by Typing 32
Figure 9 – Audio Search 33
Figure 10 – User's Home Page 34
Figure 11 – My Wardrobe Page 35
Figure 12 – My Favorites Page 36
Figure 13 – User's Profile Page 37
Figure 14 – Advanced Search Page 38
Figure 15 – Search Results Page 39
Figure 16 – Search Results after Using Filters Page 40
Figure 17 – Detailed Product Page 41
Figure 18 – Photos of the Product 42
Figure 19 – Preparation for the Try Page 43
Figure 20 –Try Page 43
Figure 21 –Try Page Drag and Drop Product's Image 44
Figure 20 – Final Look of the Try Page 45
Figure 21 – Share Product 45
Figure 22 – Get Advice Product 46
Figure 23 – Login/Signup Page 47
Figure 24 – Home Page 49
Figure 25 – My Wardrobe Page 50
Figure 26 – My Favorites Page 51
Figure 27 – Edit Profile Page 52
Figure 28 – Advanced Search Page 53
Figure 29 – Search Results Page 54

Figure 30 – Detailed Product 55
Figure 31 – Detailed Product 56
Figure 32 – Calling the Store 57
Figure 33 – Get Advice Page 58
Figure 34 – Share Product 58
Figure 35 – Opening Page 60
Figure 35 – Opening Page 60
Figure 36 – Edit Profile 61
Figure 37 – Edit Location 62
Figure 37 – Add New Store 63
Figure 38 – List Stores 64
Figure 39 – Login as Company 65
Figure 40 – Add Product Options 66
Figure 41 – Select Color 66
Figure 42 – Add Product via Excel File 67
Figure 43 – Statistical Details 68

1. Introduction

Time management is an important issue in today's life. Managing social life and business life is difficult. It is hard to spend a lot of time on a single activity in a day although there are lots of things to do. And shopping is one of the most time consuming activities. There are lots of brands and also huge shopping malls that include these brands at nearly each quarter of a town. So it is so hard for people to travel all of them and the stores inside one by one and find the exact clothes that they are looking for, especially today's rush hour life.

Vitrinn is a mobile and tablet Android application and system that aim to lend people a hand with managing their time by making shopping a lot easier. Vitrinn provides users a simple and also advanced search environment according to their clothing needs. Just a few keywords are enough for Vitrinn to bring various brands and cloth models under users' finger tips. Users can use Vitrinn both with registering to system and vice versa. Registered users can use Vitrinn more efficiently; such as they can see a simulation of how the clothes they would like to try on will look on them. Moreover, they can add clothes that are viewed from Vitrinn, either as a search result or an advice, to their wardrobes or favorite lists. The items that are added to favorite lists and wardrobes will be used for generating advices to users from the system. Generating advices is one of the most distinguishing features of Vitrinn. Vitrinn generates advices to the users every single day by combining the profile information of them and the clothes that the users added to their wardrobes and favorite lists. Combining all the common attributes of these clothes and profile information of the users, system tries to generate pinpoint advices to them. Vitrinn guarantees that the advised items will be satisfy users' tastes ninety percent probability.

Users can also use Vitrinn without signing up to system. However they benefit from it limitedly. They can use quick and advanced searches. Advance search provides users a detailed search environment with lots of search filters that reduce the search fields and increases likelihood of resultant clothes for the users' for the searches.

2. COMPARISONS WITH THE EXISTING SYSTEMS

Nowadays, online shopping becomes a big trend around the world. It is may be because of the preference of looking the clothe models through the internet instead of leaving no stone unturned in the stores within shopping malls. The number of online shopping pages increases rapidly day by day. What facilities do these online shopping websites provide to users? They can only serve the goods that they sell to users. And maybe provide users a detailed search platform.

While we were designing Vitrinn, in order to make it innovative, we decided on adding lots of new features in order to distinguish from all other online shopping applications and websites. Vitrinn keeps track of its users' likes and searches and by gathering all the activities that users have done, advises them clothes every day.

Furthermore, Vitrinn shows the closest store that the user can find their need with an address description from their current location. This is one of Vitrinn's most important features. Because the main idea of Vitrinn is to help users to find their clothing needs in the easiest way. To achieve our purpose, Vitrinn has to include various features to become preferable among users.

Last but not least, we design Vitrinn by the idea of people have no time to shop. So we help them also by letting them trying the clothes on them by the pictures of both the users' and the dresses'. And by this way, users can picture themselves in the dress and form an idea about how the dress looks on them.

3. FINAL ARCHITECTURE AND DESIGN

3.1. Overview

In the implementation of the Vitrinn, our primary goal is being preferred by the users. We add lots of features to our system in order to increase our preferability.

We propose a mobile/tablet application that offers user an easy way of shopping. Vitrinn is an application which displays clothes depending on the user's needs (style, color, etc.) and sizes from many brands' catalogs. Every user has a profile consist of size,

style, user information, location bookmarks and user's clothes which he/she already have. With a wide range of filtering options, we offer user to find a specific style of clothes, price of it and also nearest store to buy it. User can also like and share the piece that he/she bought. According to the style and size of the user, recommendations will be displayed. We provide analysis reports, advertisements and campaigns for the companies.

There is also a non-mobile part of our project. That part is for brands, shop owners use. Owner can add their shop to our application, arrange their products and add/delete products from their shop account online. Shop owners can also display statistical analysis of their products with this option of our project.

Furthermore, except various beneficial features, other important criterion for an application is its user interface. A user friendly user interface has to be understandable and simple. Besides visual schemes, also architectural design of the project has to be well designed.

Speed is a supreme concern for an application. So we used layered model architecture in order to make the communication easy and fast between program layer and data layer with user level layer. Therefore, we used Model View Controller (MVC) architectural pattern.

In addition, we also use Client Server Pattern because in the design of the project, there is a common webserver for all clients that provides services to the them.

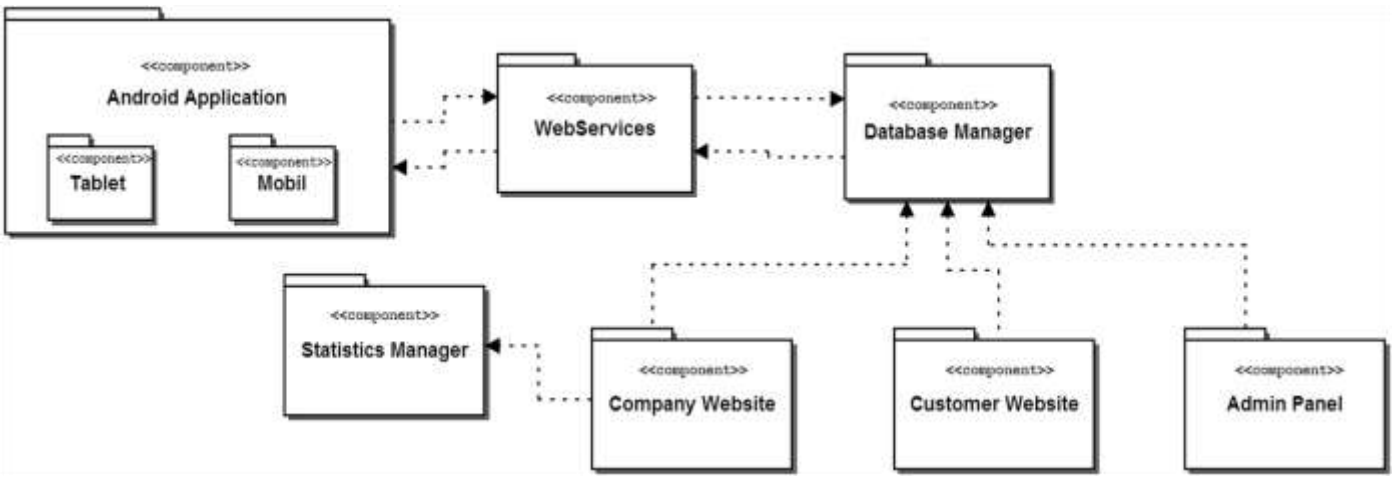

Figure 1 – Subsystem Decomposition

3.2. Subsystem Decomposition

System consists of seven fundamental subsystems as Android Application, Web Service, Database Manager, Statistics Manager, Company, Customer and Admin. Each subsystem has interconnections to other the others. Android Application subsystem is an intermediate layer between customer and the system. Web Services provides the communication between the application and database manager. Companies, customer and admins communicate with the system through the websites all designed differently for each user types.

3.2.1. Android Application Subsystem

Android application component has two sub components. These are mobile and tablet interfaces. These components are implemented with XML. Android application algorithm is developed with java.

Android application sub components are not directly connected to the database server because each server has a maximum number of connections and if we had connected application subsystem to the server, it would have caused some problems.

The communication between the Android application and the web service is established through JSON objects.

3.2.2. Web Services Subsystem

Web Service is like an intermediate layer between the Android application and MySQL Server. We divided web service in to sections according to the features of our project, such as wardrobe, favorites etc. and when application sends questions through JSON objects, web service categorizes the questions come from the application subsystem and convert them into SQL queries and sends to Server subsystem. After receiving SQL queries back from server subsystem, web service converts the answer SQL query to JSON objects and sends them back to application subsystem.

PHP, MySQL and JSON Objects are used during this communication. This component warrants communication in between server and android application. The aim to use web services is to get the output of the functions without retrieve them and pass it to database. By this component traffic of the server will be less.

3.2.3. Company Subsystem

Company subsystem is directly connected to the server. Inside the subsystem, companies can:

- Add/delete their products
- See their stores
- Add/delete stores
- Manage stores
- Find and add latitudes of the stores to the system
- List statistics

3.2.4. Statistics Manager Subsystem

Vitrinn provides lots of features to the companies within itself. These features are most commonly done within Statistics Manager Subsystem. The statistics provided to the company done in the statistics manager are:

- The percentage of being viewed as a search result among all other results
- The percentage of the viewed detailed products is your product
- The percentage of your products are shared on social networks among all other shares
- The percentage of users' calls (the numbers are provided by Vitrinn) to you among all calls

- The percentage of being added to Favorite Lists of the users among all other products

- The percentage of being added to Wardrobes of the users among all other products

- Financial Details in a dynamic table (such as stock/price)

HTML5 and SQL used in Statistics Manager Subsystem.

3.2.5. Admin Subsystem

Admin Subsystem stores the category relations, such as men-women, and manages these relationships. Moreover, the changes in Color Type List, Material List, Cleaning Condition List and Style List can be done dynamically and these changes can be instantly applied to applications. Admins can also set the relationship between categories and sizes.

Briefly, within the admin subsystem, all company managements are done. PHP, MySQL and HTML5 are used in the implementation of the admin subsystem.

3.2.6. Website Subsystem

This component is responsible of getting data from the company. Company uploads its data through the website with various ways. It has two components, view and algorithm. For view HTML CSS is used. Algorithm is written with PHP language with AJAX for data passing, JQuery for the animations.

3.2.7. Database Manager

Database Manager is responsible for all database related jobs. It saves the product information which is uploaded by company. In addition it stores the store locations and clients information. Tables which are managed in this component are; User, Product, Product_type, Size_type, Style, Belts, Bras, Company, Gloves, Hats, Rings, Shoes, Wardrobe.

3.3. Architectural Patterns

We used Client Server Pattern, Singleton Pattern and Strategy Pattern in our implementation.

3.3.1. Client Server Pattern

In our system, there is a common Webserver for each client. This Webserver has a MySQL Database Server that stores all information about companies, users and products in the system. The role of the client, customers, is the requester and Web Server is the provider. Client knows which services that the server can provide to be benefit from, such as adding or deleting products to their wardrobes and favorite lists. After performing these services, web server return results to the client. Instead of having multiple clients, there can be only one webserver that includes the MySQL Database that the clients seek data from.

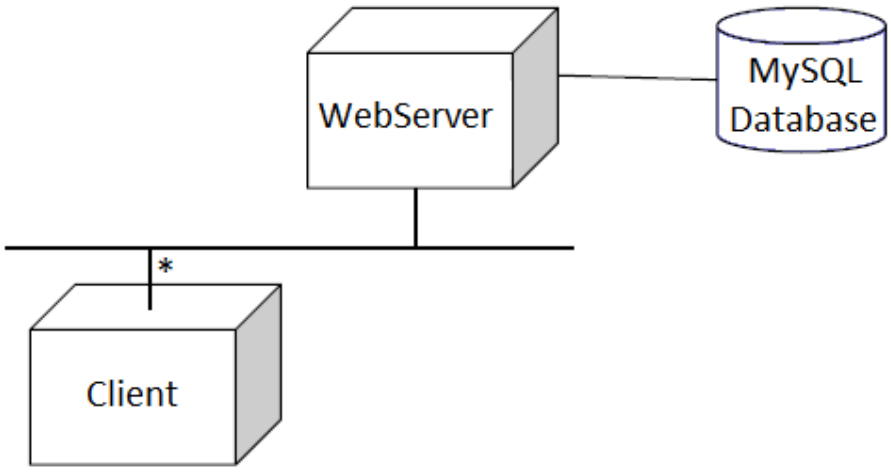

Figure 2- Client Server Pattern

3.3.2. Singleton Pattern

In this system Singleton Pattern is used in classes that are composed of one instance of their objects. The classes that are designed with singleton pattern are commonly Location Services and Loaders. For instance **PhotosLoader** class can be an example to this design.

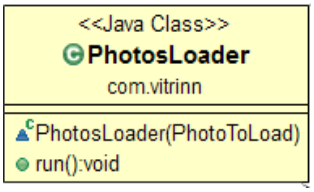

Figure 3a- Singleton Pattern

3.3.3. Observer Pattern

Observer Pattern is used to model 1 to many dependencies between objects. It connects the state of an observed object, the subject of many observing objects, the observers. The consistency to all observers is maintained by notifying them in each update as there are many of them to change it. In this system this design is used in many classes. Generally it is used in classes with methods **doinBackground**() with this method observers can change subject. To notify all observers pre and post execute commands were used. For example, in Wardrobe class with the usage of **GetPics** class we have observer to show objects that are selected depending on some information, and also this class can change that subject with **doInBackground**() functionality.

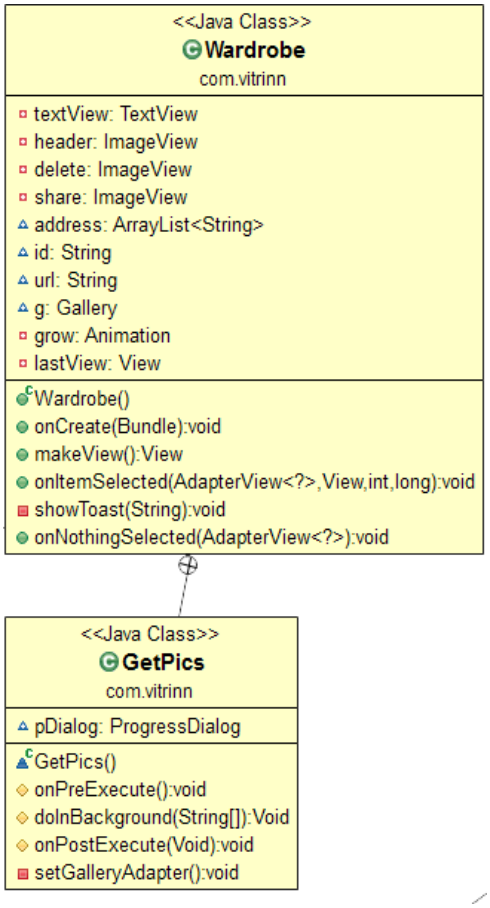

Figure 3b- Observer Pattern

3.3. Hardware/Software Mapping

This subsection provides the representation of the system by mapping the functionality of the software architecture onto the hardware architecture and showing the user interaction with these components.

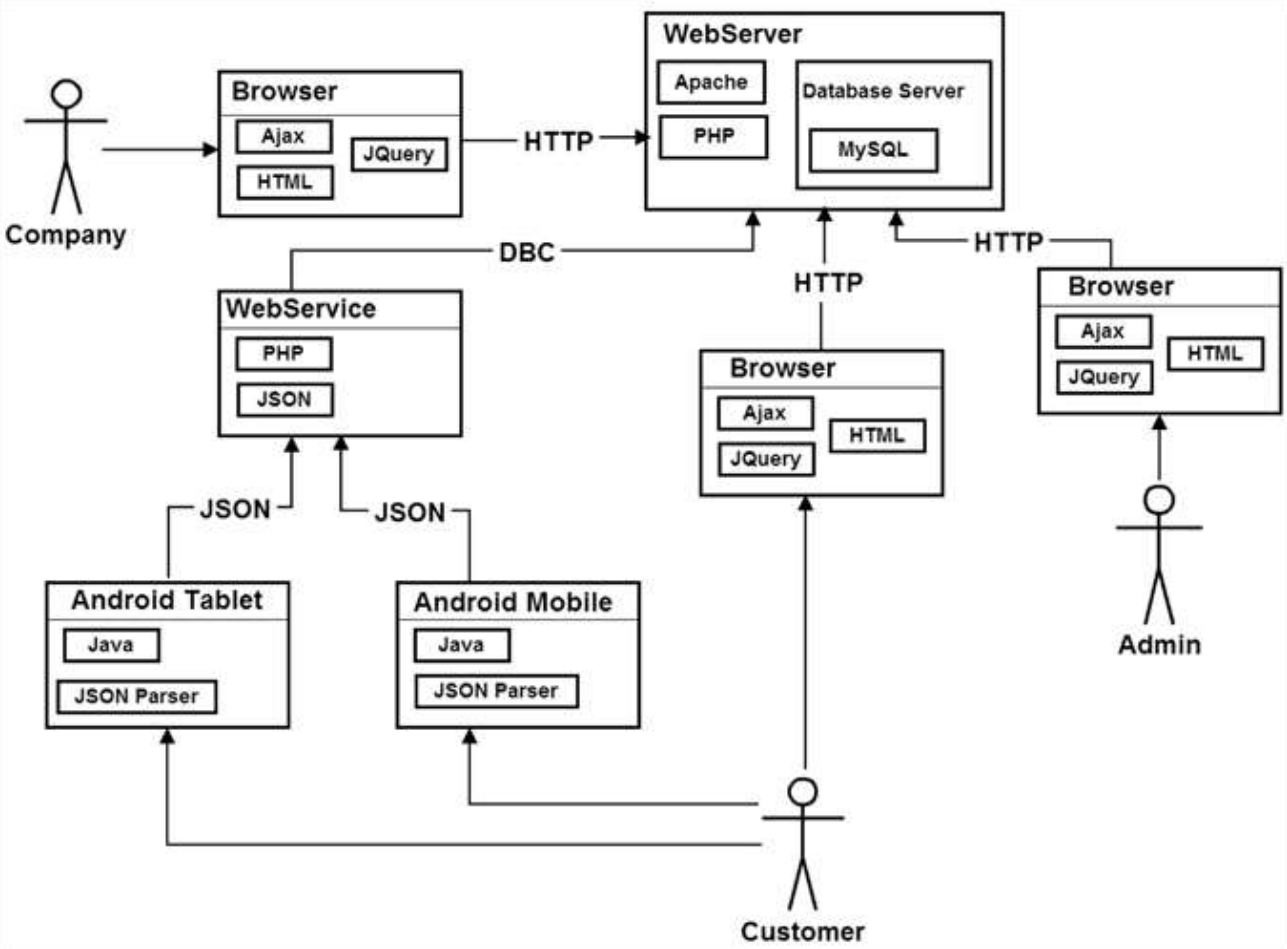

Figure 4 – Deployment Diagram

There are three different kinds of users; companies, customers and admins. They can all use the system at the same time. According to this mapping, it is aimed to show that the client, a company website, an admin website or a customer website, will request information from server when needed by using the HTTP connection and server will get the information from the instance of MySQL database server and send back to the browsers of company, customer or admin that is on client side. This path will be performed when exporting data. When importing data, in a similar way, program that is on the client side will send the data by using HTTP connection and server will put the information to the instance of MySQL database server and send a feedback to Client.

Furthermore, customer uses Vitrinn as the Android application has to request information from server through Web Service when needed by using JSON objects. Web service transports client's request by using Database connector and then server will get the information from the instance of MySQL database server and send back to the web service by using the database connector. This path will be performed when exporting data. When importing, in a similar way, client will send the data by using JSON objects and then using database connector and server will put the information to the instance of MySQL database server by using arrays and send a feedback to Client through web service

3.4. Persistent Data Management

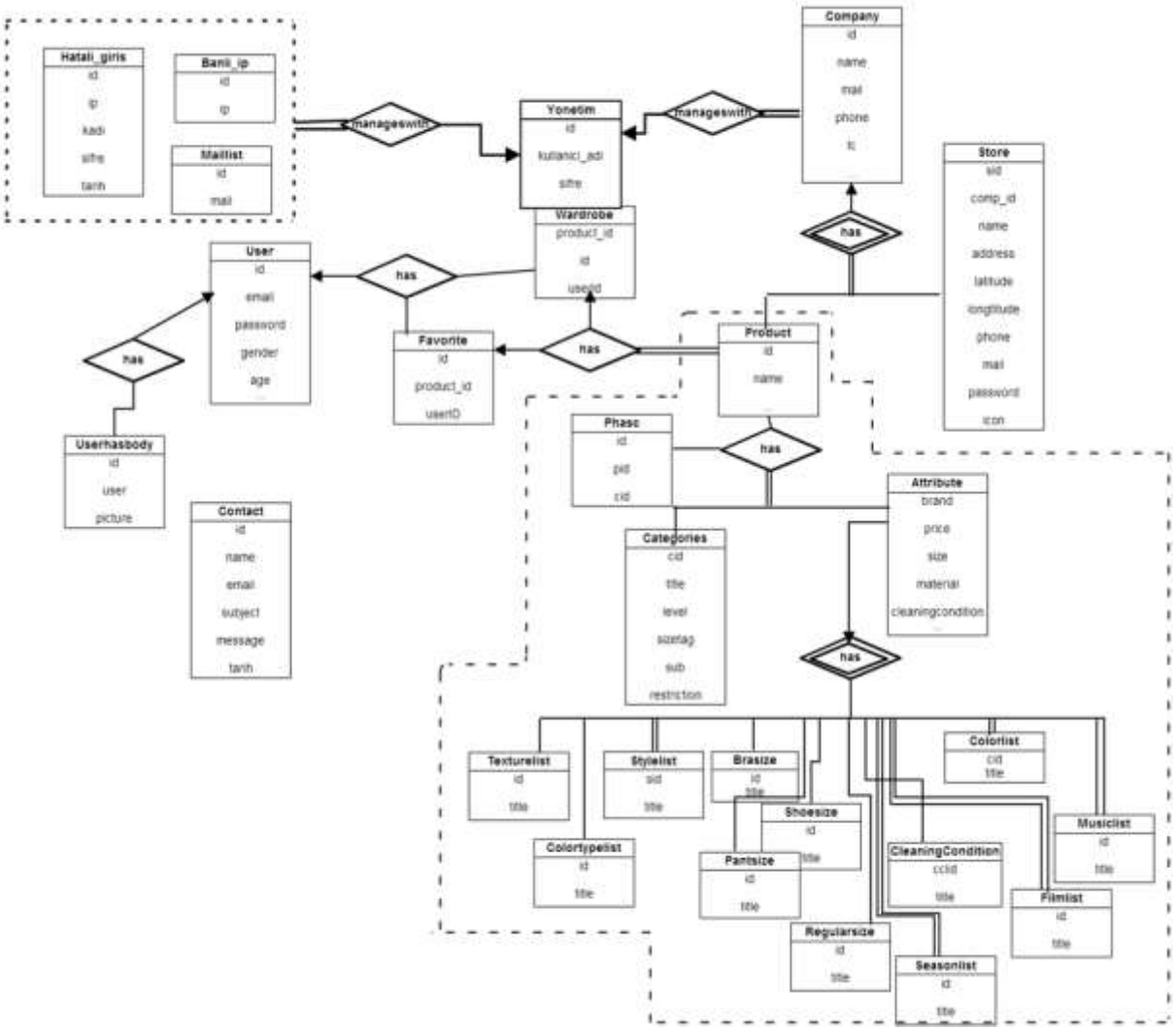

Figure 5 – E/R Diagram

3.5. Design Decisions

In this section, the decisions taken during the design and implementation process are explained.

3.6.1. Java

We used Java, because we have to. Hence Android applications are developed in Java. However its implementation was easy and there were lots of internet sources that we can get help from.

3.6.2. MySQL

The application needs an extremely large database since there have to be lots of products to be stored in it. Furthermore, we do not have a financial support to use Oracle or PSQL, we used MySQL.

3.6.3. PHP

We had two options, PHP or .Net. We prefer PHP server according to their prices. In addition, PHP is better than .net in terms of speed/performance.

3.6.4. JQuery

If we supported financially, we would have preferred Silverlight instead of JQuery for website animations. However, we used JQuery.

3.6.4. JSON

We could have used either XML or JSON for providing the communication between the data server and Android tablet/mobile applications. However we preferred JSON because both Java and PHP includes JSON class. So it is more advantageous to use JSON objects.

3.6. Class Diagram

Class Diagram is attached to the end of the report.

Figure 6 – Class Diagram

3.7. User Scenarios

Vitrinn has three kinds of users

- Client
- Company
- Admin

3.6.1. Client Scenarios

Clients can use Vitrinn Application by both logging in to the system or not.

3.6.1.1. Scenarios of the Unregistered Users

Users that use Vitrinn Application without logging in shall see a search box that makes the search with only taking few keywords from the user. Users shall also enlarge their search by advanced search option as like as users logged-in to Vitrinn Application. After users complete their search through simple search or advanced search, they shall view the search results according to their needs, such as closest to furthest, lowest price to most expensive price. They shall get information about the item that they want further information by touching the photo of the item among the list. Information belong to the item include, it's price, composition, brand, how many likes it gets, how far it is and also an option that provides user to get a route to the closest store of the item is found between their current location. They shall sign up to Vitrinn Application for getting further benefit.

Participating Actor: Bob is a 22-year-old male. He is an undergraduate Student plays guitar in a rock band. He does not care his clothing too much. His one and only criteria for his clothes is being comfortable.

Scenario 1: Make Quick Search

Bob needs a black t-shirt immediately because the one that he owns just ripped. He opens Vitrinn Application. He types “black t-shirt man” keywords to the quick search. He does not want any pattern so quick search satisfies his needs. In addition, because of not care about his clothing, he does not need an account.

Scenario 2: Selecting a Filter for Viewing Results

Bob makes a search and does not pay so much money to a simple black t-shirt. So after the t-shirt options appear on his screen, he changed the showing order to “lowest price to highest” and making the lowest priced t-shirts view on the screen more recent.

Scenario 3: Get Information of an Item

After making his search of black t-shirts and selecting lowest price to highest filter, Bob decides on a t-shirt and in order to learn more about it, he clicks on the view of that t-shirt on the screen. Then price, brand name, composition, nearest store’s stock and location information will appear on the screen

Scenario 4: Requesting a Route to Nearest Item’s

Bob does not like shopping. He wants to go and get the thing that he wants. So Vitrinn provides it to Bob by viewing the closest place that he can find the t-shirt that he likes. In addition to that, Vitrinn provides a route between his current location and the closest store that his t-shirts found.

3.6.1.2. Scenarios of the Logged in Users

Users that are logged into the system shall be able to do the things that the users do not log in shall do and shall be able to do many other things. View their profile pages without re-login to the system every time that they open the Vitrinn application. Their profile pages include a search box, advanced search option, “Get Advice” button, a news flow (such as liking an item) from other users that they follow, editing their profile page option, viewing their profile option, viewing the “My Favorites”, “My Wardrobe” and the people list that they follow also an option to edit them. Being able to get advices from the system is the major difference that distinguishes a user with an account and without an account. The more users add information to their account, the more they will benefit from getting advice future. In addition, they shall view other users’ profile pages by a search box or among a list under each item that shows that add that item to their “My Favorites”. They shall follow the users that they appreciate their taste of fashion.

Participating Actor: Sally is a 30-year-old female, who starts working at a bank after graduating from university. She complains about how much she works and how she gets tired at the end of the day. As a matter of fact, she has no time to go shopping and even she has, she does not want to spend all her spare time rambling backwards and forwards among the stores.

Scenario 1: Get Advice

Sally does not decide on what she needs but she wants to enrich her wardrobe. Instead of making an advanced search, because she does not know what she wants, she selects “Get Advice” in order to get advises from the system according to her profile information. Various red dresses will appear on the screen just as her taste and the information that she had added to her account.

Scenario 2: Add to My Wardrobe

Sally feds up seeing the t-shirt that she bought a few weeks ago over and over again when she types, “striped t-shirt” into quick search box and views the result. She was about to close the application “Add to My Wardrobe” button catch up her eye. After clicking it, that striped t-shirt added to her wardrobe and never views on the list of the search results again.

Scenario 3: Add to My Favorites

Sally viewed the Top 100 list of dresses according to the number of users who add them to their favorites, in order to explore what is popular. She also liked the skirt placed at 33rd and added it to her favorites list. One week later, when she again does not know what to buy to her date for dinner, besides clicking “Get Advice”, she also looks to her the list of dressings at her “My Favorites” list.

Scenario 4: Edit Profile

Sally does not like wearing colorful dresses, but after seeing that kind of dresses on the users that she appreciates and follows on Vitrinn, she decides to add some colorful dresses, t-shirts and trousers to her wardrobe. So she clicks on edit profile option and add her style information that.

3.6.1.3. Scenarios of Companies

Vitrinn’s main purpose is not to sell items, Vitrinn tries to make people’s job easier while searching for clothes. Companies share their database to Vitrinn in order to show off their products to customers via Vitrinn Application. In addition, Vitrinn provide companies opportunities to get famous and advertise. So Vitrinn is a like an intermediate layer between companies and customers, it makes companies’ job easier by providing them an environment to present their products. Companies can

make use from Vitrinn only by joining, it's network and of course, admin of the Vitrinn has to approve it.

Participating Actor: Abcs is a company that specialized on women's clothing for five years.

Scenario 1: Join Vitrinn's Network

Abcs not known because it's store located in a small shopping store that is far away from the city center. Therefore, its sales are not going well. Store manager search for an advertisement to make Abcs known by the society. Then he learned that there is an application that may help them to introduce their products. He send request to Vitrinn in order to join its network.

Scenario 2: Add to Store

Two weeks later then Abcs joined to Vitrinn's network, its sales increased and known slowly by the society. New season comes and Abcs brings new season's clothes. In order to get benefit from Vitrinn, it has to upload its new products to Vitrinn, to reach customers.

Scenario 3: Add to Store

Abcs's sales manager does not sure about joining to Vitrinn family. He wants to be sure about Abcs profit from joining Vitrinn. So he decides

Take a look at the statistics belongs to customer activities until they join to Vitrinn. After logging in and select statistics, he sees both financial and statistical details on the products. There are various fields of statistics that he can see all the customer activities related to their company. And his satisfaction on Vitrinn increases more and more.

3.6.2. Scenarios of Admin

Admin of the system does the major job of the application. It arranges the share of companies' databases, getting updates from companies. In addition, admin evaluates incoming requests from the companies.

Scenario 1: Delete Company

Admin realizes Opart Men's wear does not have any updates or activity for last one year after joining Vitrinn's network. In addition, store manager of Opart does not send any reply to admin's messages. Therefore, admin decides to delete Opart from the network.

4. TOOLS AND TECHNOLOGIES

4.1. The Android Development Tools (ADT) for Eclipse: The graphical user interface of the application is implemented in *The Android Development Tools (ADT) plugin for Eclipse*. The basic layouts of each page are written in XML and the effects, animations and functions of each GUI item implemented with Java. In order to be distinctive and individual, we create our metaphorical icons and titles by Photoshop.

4.2. HTML5: The graphical user interfaces of Vitrinn that companies', admins' and customers' websites are implemented by HTML 5.

4.3. PHP: Used in implementation of Webservice, admin and company panels.

4.4. Java: Used in the implementation of Android mobile and tablet applications.

4.5. JSON: Used for providing the communication between data server and Android tablet and mobile applications.

4.6. Apache: For each HTTP, HTTP-S connection, Apache is run.

4.7. Ajax: Used for asynchronous data pass before the page changes at company and admin websites.

4.8. Kendo UI: Provides the data pass at the background of statistics manager website. Used also for creation of the pie charts and diagrams.

4.9. Image Magick: Used in image processing.

4.10. XML: Used during the implementation of the user interfaces of both Android tablet and mobile applications.

4.11. AmbilWarna: This is a small library for your application to enable the users to select an arbitrary color. It is used in the free Bible applications for Android

4.12. UniversalImageLoader: This library project aims to provide a reusable instrument for asynchronous image loading, caching and displaying.

4.13. NewQuickAction3D: This is a small android library to create QuickAction dialog with Gallery3D app style.

4.14. MemoryCache Class: This class is used to store images and load larger set of images at once.

4.15. Google Map API: With the Google Maps Android API, we can add maps based on Google Maps data to our application.

5. RESOURCES USED

5.1. Image Magick: Used in Try Page. Used for cropping the users' photos' backgrounds.

5.2. JQuery: is a JavaScript class. Used for HTML DOM management.

5.3. JQuery UI: Used in **Try Page.** Used for drag, drop and resize issues of the products' images on users' photos.

5.4. HTML to Canvas: Used for taking screenshot of canvas.

5.5. Innova Wysiwyg: Used as text editor.

5.6. Excel Reader: Is a PHP class, for reading Excel documents.

5.7. Google Map API: Used for getting users' current locations and stores' and companies' locations.

5.8. **Direction API:** Used for providing users address descriptions starting from their current locations to the nearest stores' locations. Furthermore, it is used for finding the nearest store that the desired product is sold.

6. IMPACT OF ENGINEERING SOLUTIONS

6.1. Ethical Issues

Vitrinn is an interactive application. In order to get a hundred percent efficiency, users have to enter their whole information about their body sizes and detailed information about their physical appearances'. While developing Vitrinn, we tried to follow ethical issues related to users' secrecy of profile information. We tried not to violate any ethical issues related to users' profiles.

Furthermore, Vitrinn have to follow ethical issues during presenting users the models of the product that they searched. The pictures of the products have to be realistic and no more or less than what they look like in order to not lose users' trusts. Because as engineers, we have to use our knowledge and skills in order to facilitate clients' lives. So being honest and objective is so important and also beneficial for the engineering profession.

6.2. Economic Issues

Vitrinn helps companies to getting known by the society. There may be lots of stores who people pass by without even visiting them. Through Vitrinn, in the result list, various brands will be seen by the users. By this way, people can discover new brands and started to follow their collections. Hence, brands make their names and advertisement automatically via Vitrinn.

Moreover, users also make a profit by using Vitrinn. They may find the clothes that they are looking for with the cheapest prices via Vitrinn. This is possible by Vitrinn's "advance search" filters. Users can determine the price range before they make their searches. We tried to avoid branding and instead, put the exact clothes that users searched at their disposal.

6.4. Contemporary Issues

This version of the application can be used in Android tablets, phones and websites. However, it can be developed to be also used in IOS tablets and phones. Moreover, this version of Vitrinn is only for finding the closest resultant store for users' searches, but users can shop through Vitrinn.

Current version let users create profiles but in the future, it can also be developed as a social network, where users shall follow each other and see each other's wardrobes and favorite lists.

7. USER MANUAL & SCREENSHOTS

Vitrinn has three kinds of users; customers, companies and admins. Users can use Vitrinn through an Android tablet or mobile phone and website of Vitrinn. Companies have a website and so admins.

7.1. Customer's User Manual

Vitrinn can be used by both registered and not registered users. All kinds of users can do quick and advanced searches. Also see the view the closest stores that the clothes they are looking for and also get an address description from their current location to that closest store. However, users with an account can also make use of the other features of Vitrinn, such as getting advice or adding an item to their wardrobe by clicking on **Add Wardrobe** button (this prevents that item to be viewed once again in the result list to a search) and favorite lists by clicking on **Like** button. Moreover, registered users can get advices from the system according to their wardrobes (stored in My Wardrobe), the items that they liked before (stored in My Favorites) and the information that they gave during signing up. The more information that users share about themselves, the more efficient the **Get Advice** feature gets. So after signing up, users should click on **My Profile** button placed in their home page and after opening their profiles, they should click on the edit profile icon placed right most corner of the screen and fill as much blanks as possible.

Just like sharing as much information as possible to make maximum use of the get advice feature, users also have to specify as much attributes as possible for the advance search page.

After the search, the results for the searches viewed to users. If users want to get more information about an item, they have to click on the item. After that, detailed product page opens and user can see the various pictures of that item taken from different perspectives. Also, users can see the closest store that they can find their desired cloth in with an address description from their current location. There are also some options like; **Share** button, for sharing the picture of the item to social network pages of the users; **Like** button for registered users to add the item to their favorite lists; **Add Wardrobe** button for registered users to add the item to their wardrobe and **Try** button for registered users to see the simulation of the cloth on them through the pictures of both theirs and the cloth.

For mobile application, in addition to all those features, they can also call the store that includes the product that they are looking for by clicking on the number in detailed product page.

7.1.1. Vitrinn Android Tablet Version

7.1.1.1. Loading Page

Figure 6 – Vitrinn Tablet Version Loading Page

In the figure above, the screen view shown that when the user taps on Vitrinn application to open it. Users have to wait for four second in order to reach login page of Vitrinn after this loading page opens.

7.1.1.2. Login/Signup Page

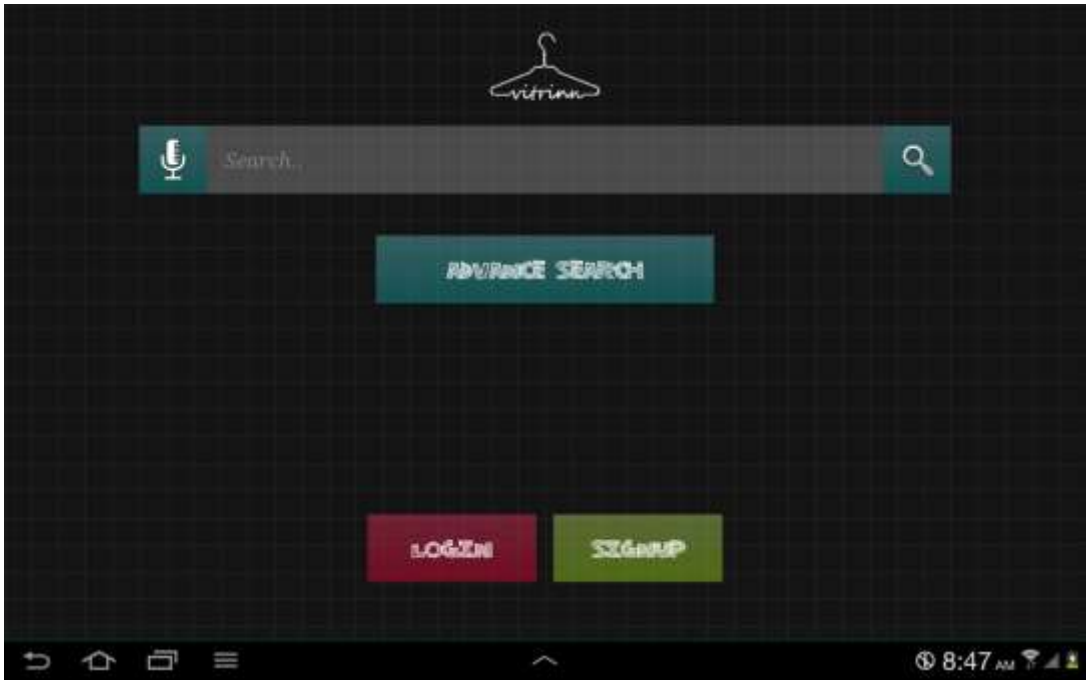

Figure 7 – Vitrinn Login/Signup Page

The page shown in figure 7 is the page opened after the loading page shown in figure 6. This page can be used by both registered and not registered users. Registered user can select login and go their home pages or do their searches. Unregistered users can select signup button and register to Vitrinn in order to benefit from all features of Vitrinn.

7.1.1.3. Making a Quick Search

Figure 8 –Quick Search by Typing

Users can make quick searches on the cloth they are looking for by typing a few key words about the product just like it is shown in figure 8. A smart search system completes their searches according to the tags in the database.

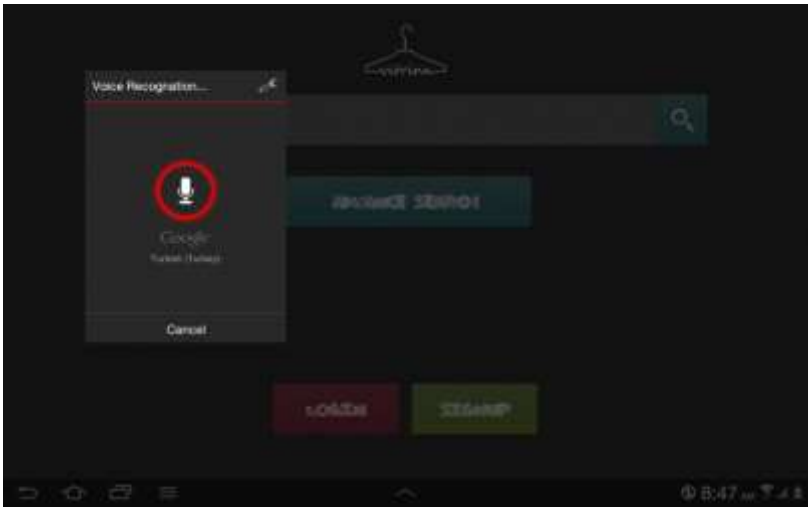

Figure 9 – Audio Search

Another choice for making a quick search is making the search by speaking into the microphone rather than writing the keywords in the search bar just like shown in figure 9. Users can tap on the microphone icon on the left of the search bar, and speak the keywords belonging to the cloth into it.

In order to complete the quick search, users have to tap on the magnifying glass that symbolizes start searching, after typing or speaking the keywords.

Furthermore, users can select Advance Search Button placed under the quick search bar, in order to limit their searches.

7.1.1.3. Home Page

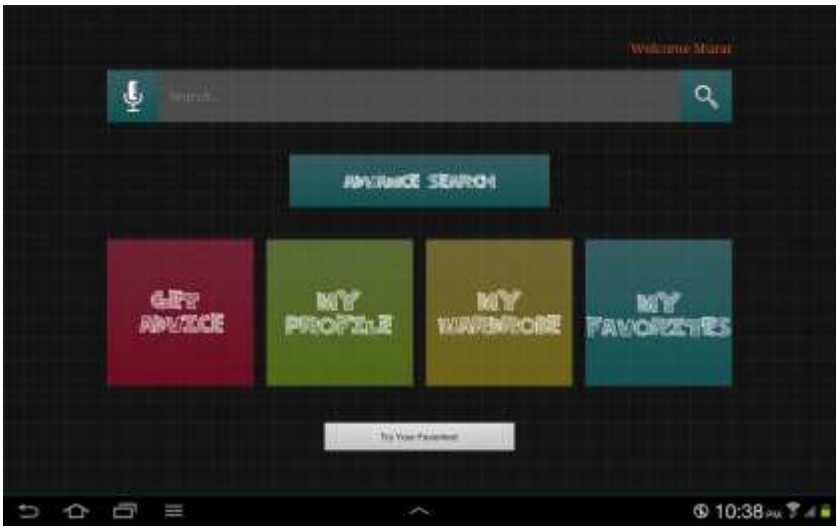

Figure 10 – User's Home Page

After logging in the system, user views the page shown in figure 10. The search bar and advance search button as works as the login/signup page shown in figure 7.

Registered users have wardrobes, favorites and profiles. Through the **My Profile** (will be explained more detailed in section 7.1.4) and **My Favorites** buttons (will be explained more detailed in section 7.1.5), they can view the products that they have added to their wardrobes or favorites.

My Profile button (will be explained more detailed in section 7.1.4) shows users their profiles and users can update their profiles through that page.

By selecting on **Try Your Favorites** button, users are directed to Trying Page that is explained in section 7.1.1.9**. Trying Page**.

Vitrinn's one of the most important features is giving advice to the users. These advices are produced by mixing the personal information of users, the products that they have added to their wardrobes and favorites. By selecting **Get Advice** button, users can view the product that the system suggests them.

7.1.1.4. My Wardrobe Page

Users can add the clothes that they come across at the result page viewed after their searches. Seeing a cloth that they already own at the resultant products to their searches will be annoying for users. In order to prevent that problem, Vitrinn provides users to form their own wardrobes and not return the items after their searches within their wardrobes.

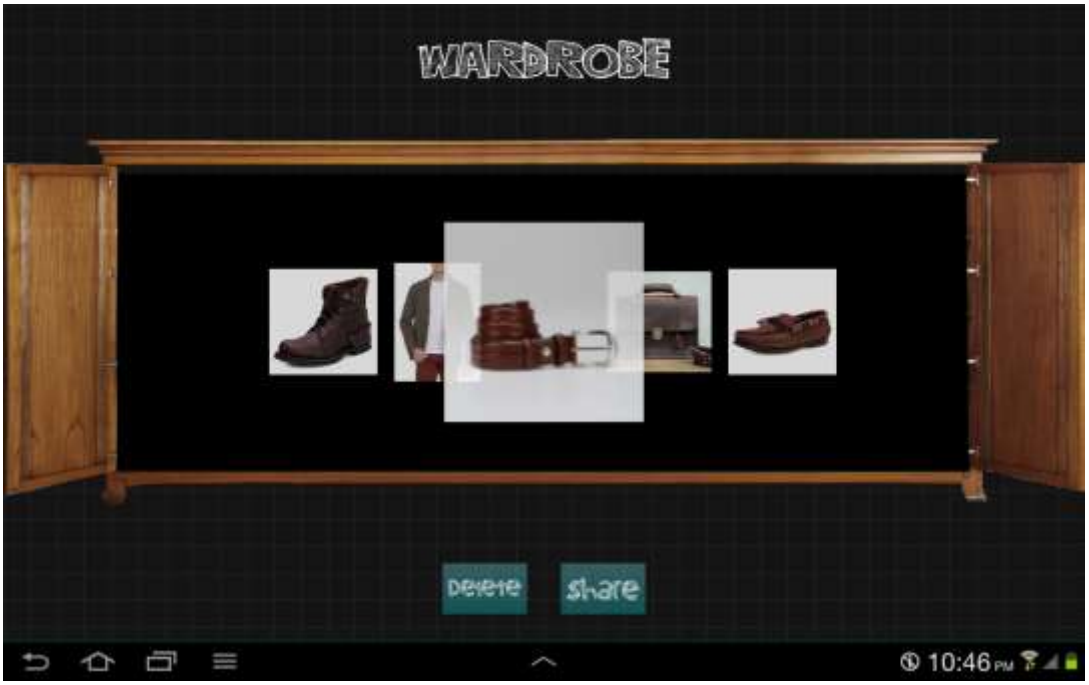

Figure 11 – My Wardrobe Page

Users can also share their wardrobes by selecting **Share** button under their wardrobe. Share feature will be explained more detailed in section 7.1.1.11.

The products located in the wardrobe can be deleted by selecting the **Delete** button placed under the user's wardrobe.

7.1.1.4. My Favorites Page

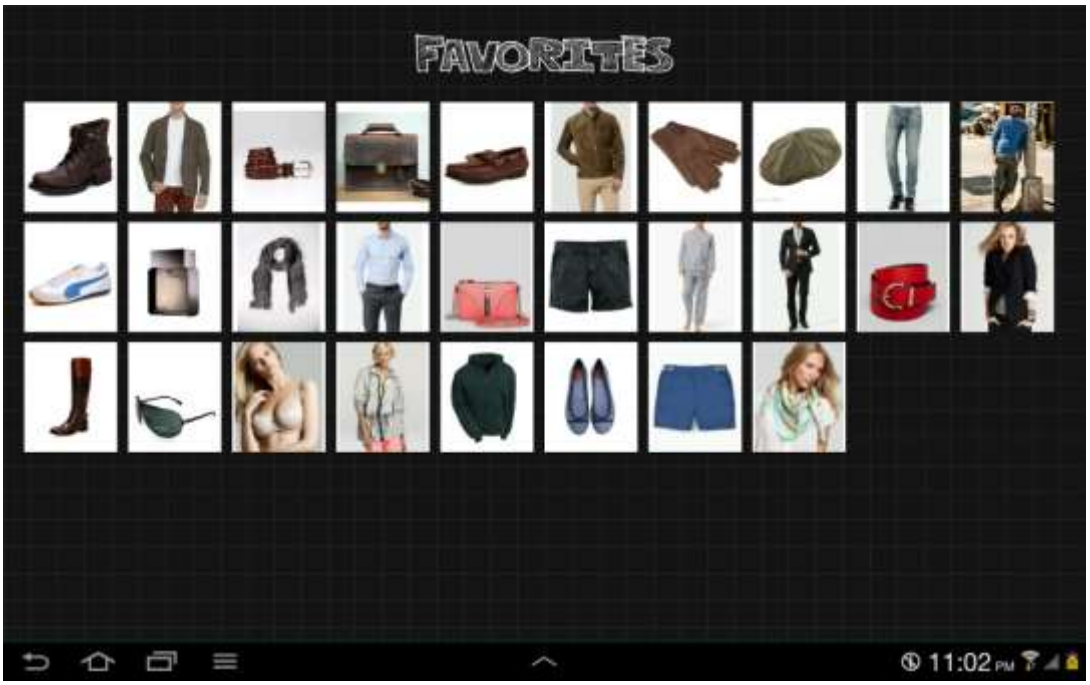

Figure 12 – My Favorites Page

Users can add the products that they like into their favorites. The favorite products are shown just like in the figure 12.

Favorites of users are stored because they will be later on used during creating advices for them. Moreover, users may want to view the products that they had liked and decide to buy them.

7.1.1.5. Edit Profile Page

Users can edit their profiles through their profile pages shown in figure 13.

Figure 13 – User's Profile Page

Users can view their profile information that they had shared with Vitrinn at their profile pages. They can also update the information that they had shared by selecting the **Edit** button placed at right top corner of the page. After selecting edit button, the text fields and spinners become brighter. After the updating process ends, users have to select **Save** button that is located in the exact place of the edit button.

Furthermore, users can upload their photo or change their existing photo by tapping on the profile picture symbolized with a default profile page icon at the left top corner of the page. They can take a new photo or choose an existing photo from their tablet's library. Edit Profile page includes various information requests in order to analyze users' fashion style. Users have to share as possible information as they can in order to benefit from the **Get Advice** with a maximum efficiency.

7.1.1.6. Advanced Search Page

Advanced Search is used by the users who want to limit the search field by giving more details about the clothes that they are looking for.

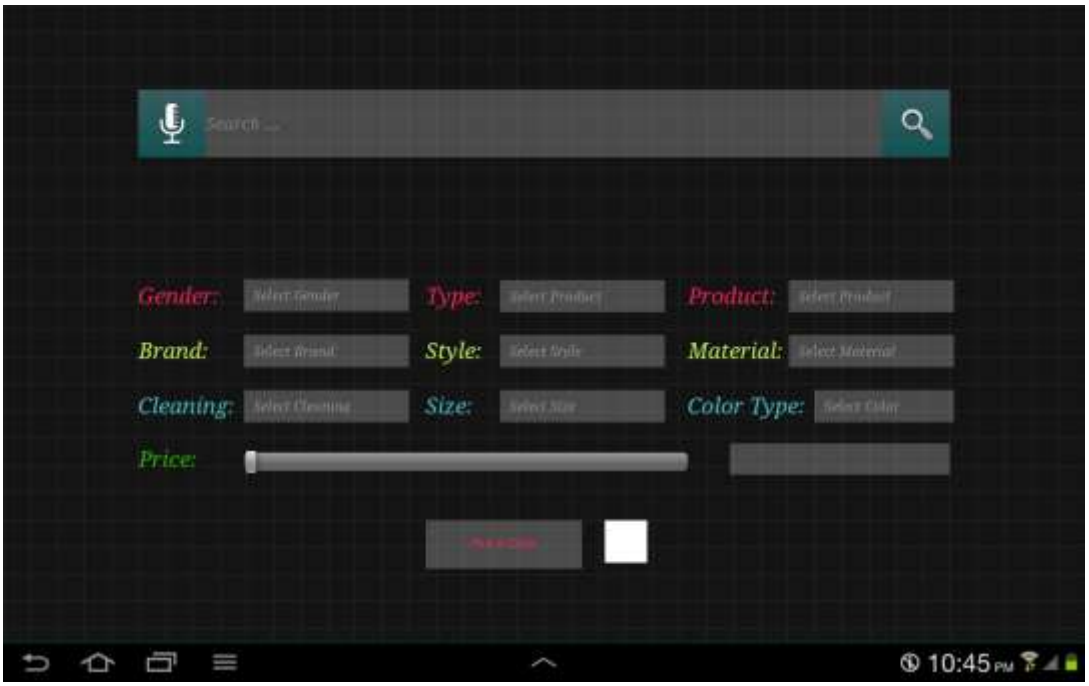

Figure 14 – Advanced Search Page

As it is seen in figure 14, there are various criteria in order to help users to limit their searches. In order to complete their searches, users again have to select the magnifying glass that symbolizes the search action.

7.1.1.7. Search Results Page

After registered and unregistered users complete their both quick and advanced searches, they will view the page shown in figure 15.

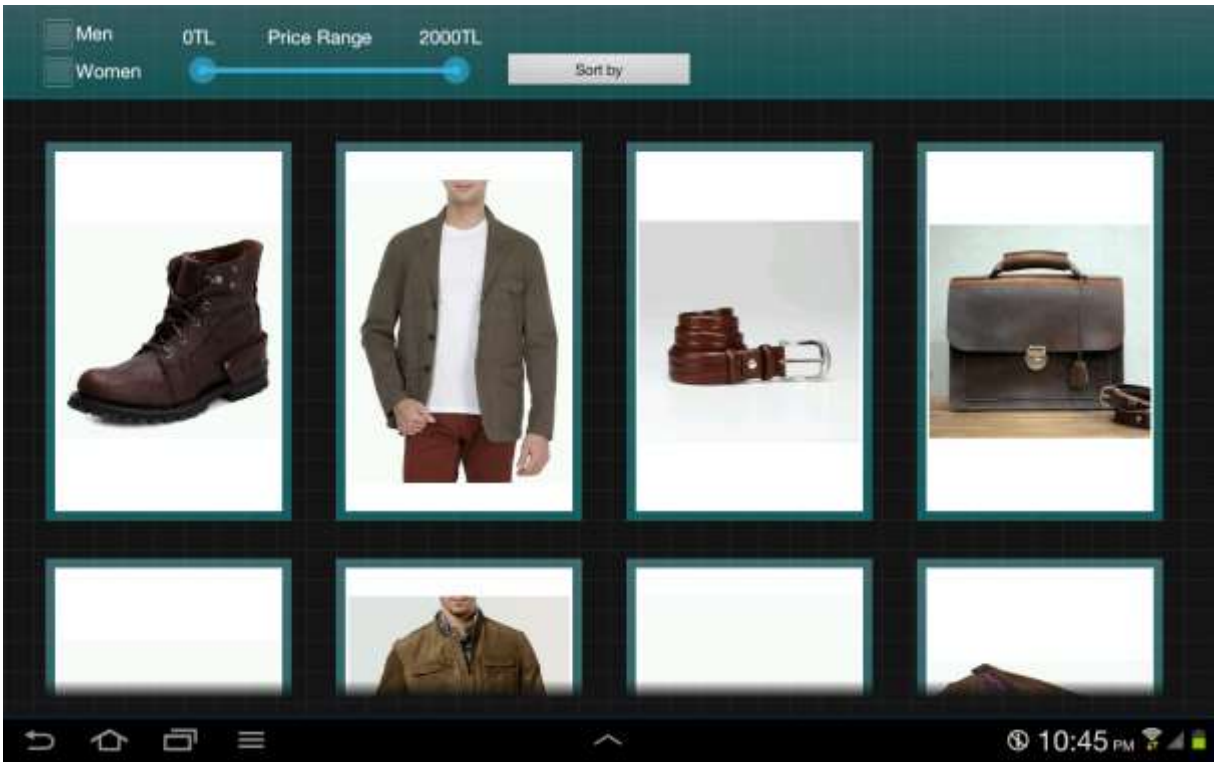

Figure 15 – Search Results Page

After getting the resultant products of the search, users can view these items according to their prices, genders and the distance of the store that the product is on sale and users' current location. Users arrange the result list arrangement according to their needs. If they are looking for the nearest store, they have to select **Sort by** button and then **Distance: nearest**. Or if they want to view the resultant product list according to their prices, they have to use the bar denoted by the **Price Range** and then they have to choose the sorting type again by selecting **Sort by** button. Moreover, they can eliminate the opposite gender's product by selecting the Men and Women checkboxes located in the left top corner of the screen. The filters for the result list of the products are shown in the figure 16.

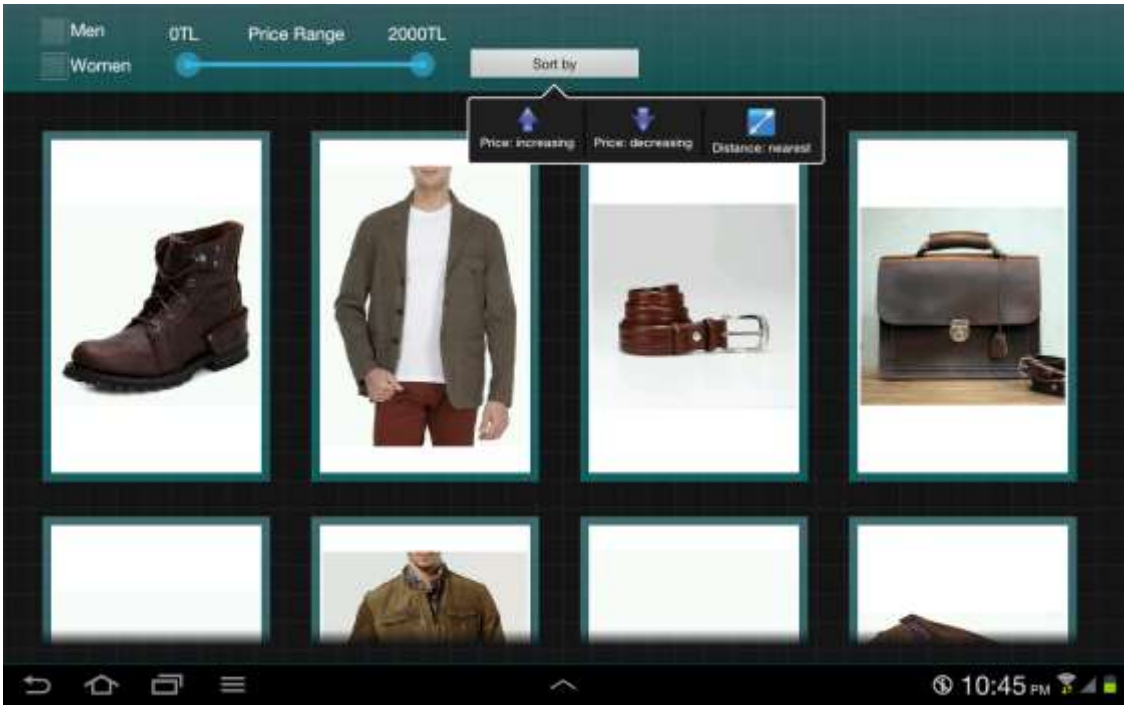

Figure 16 – Search Results after Using Filters Page

7.1.1.8. Detailed Product Page

After getting results to their searches, if a product attracts user's attention, user can view more information about that product by selecting the image of it. After selecting the image, the page shown in figure 17 is shown to user.

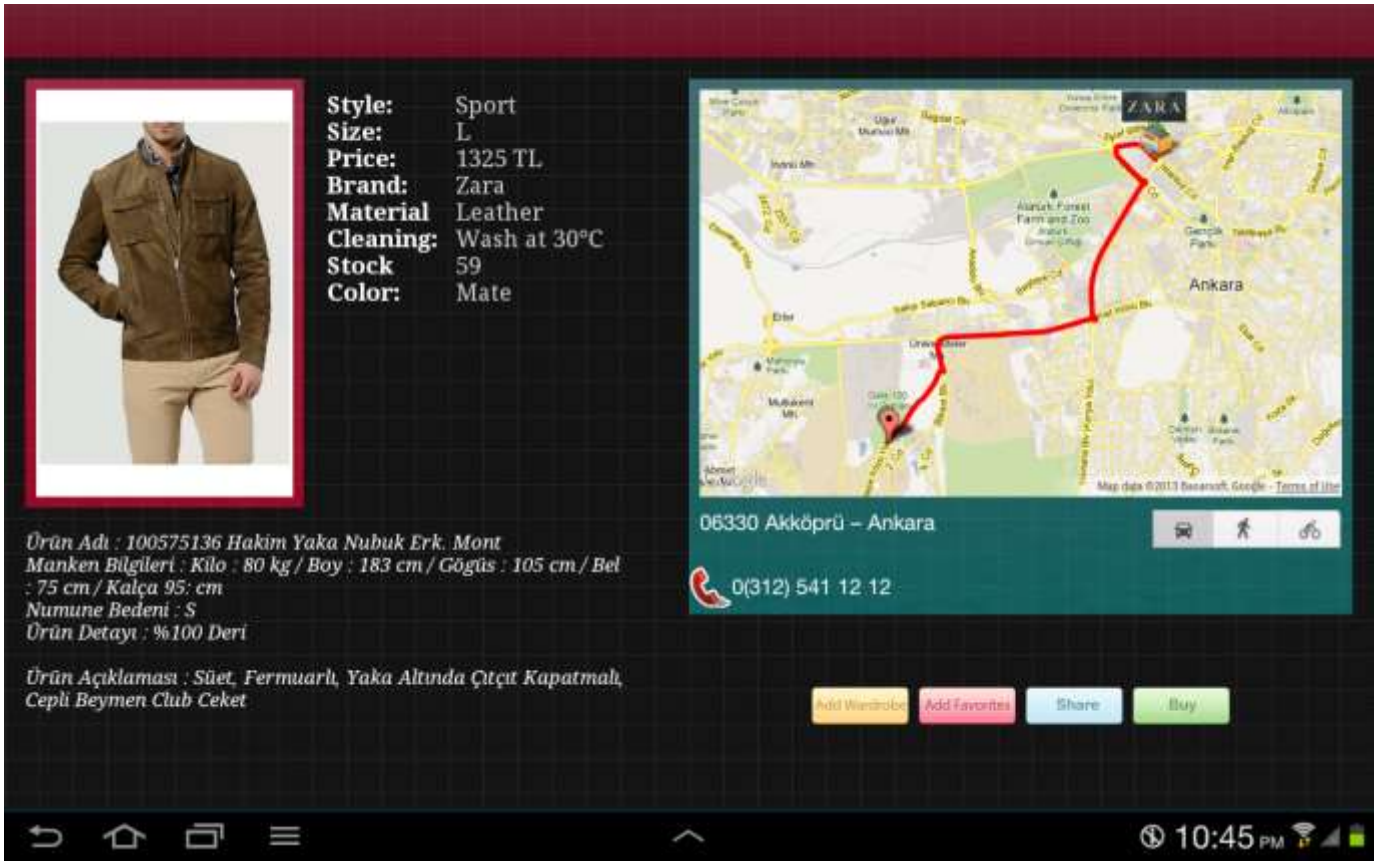
Style: Sport
Size: L
Price: 1325 TL
Brand: Zara
Material Leather
Cleaning: Wash at 30°C
Stock 59
Color: Mate
Ürün Adı : 100575136 Hakim Yaka Nubuk Erk. Mont
Manken Bilgileri : Kilo : 80 kg / Boy : 183 cm / Göğüs : 105 cm / Bel : 75 cm / Kalça 95: cm
Numune Bedeni : S
Ürün Detayı : %100 Deri
Ürün Açıklaması : Süet, Fermuarlı, Yaka Altında Çıtçıt Kapatmalı, Cepli Beymen Club Ceket
ZARA
Ankara
06330 Akköprü – Ankara
0(312) 541 12 12
Add Favorites
Share
Buy
10:45 PM

Figure 17 – Detailed Product Page

Just like it is shown in the figure 17, the details of the product and the address description starting from the current location of the user to the nearest store that the product is on sale is provided to the user.

If users want to zoom into the image of the products, they have to tap on the image, and then the image of overlay to the screen and user can see other images belongs to the product that are taken from other perspectives by selecting the arrows located in the left and right of the product's image. The screenshot of this action is shown in figure 18.

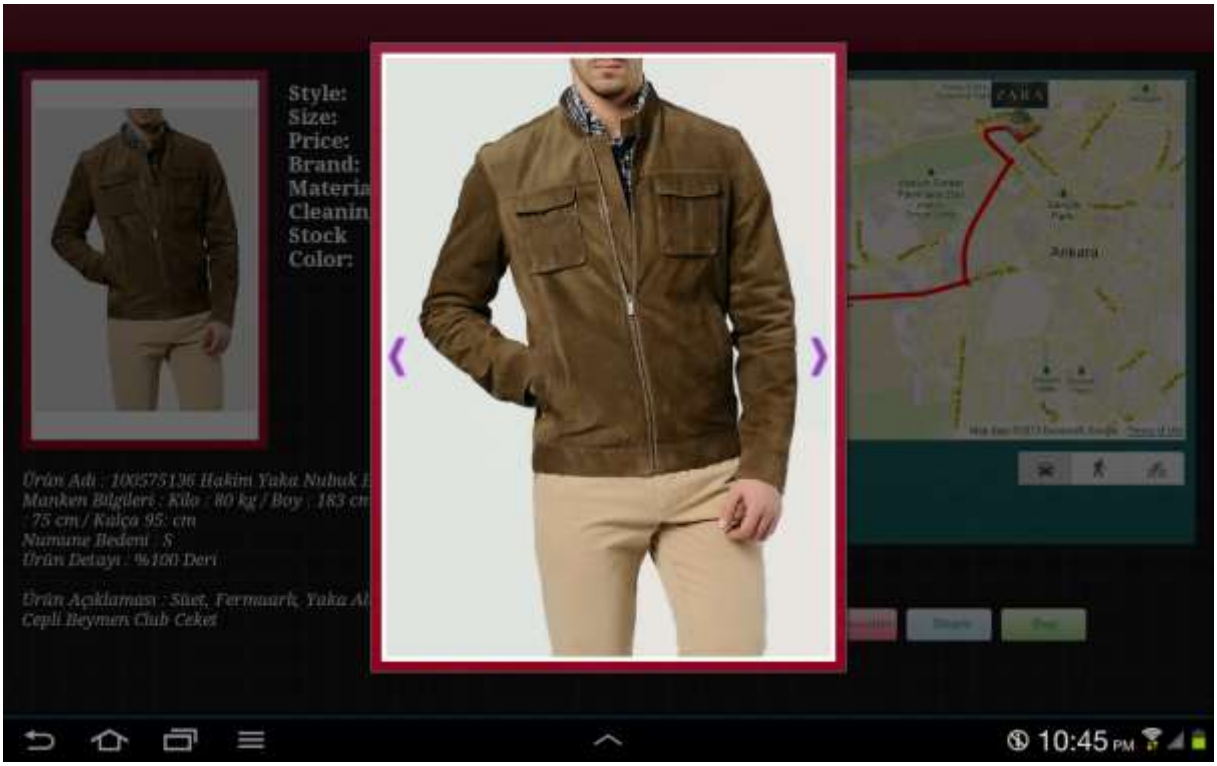

Figure 18 – Photos of the Product

Registered users can also add the product to their wardrobes and favorite lists by selecting the **Add Wardrobe** and **Add Favorites** buttons located under the address description window.

Furthermore, both registered and unregistered users can share the product by selecting Share button located under the address description window.

7.1.1.8. Try Product Page

Try Button is placed in the home page of users. Try page provides users to form an opinion about how a cloth will look on them. When user select **Try** button, until the images of both user's and products get ready, the screen shown in figure 19 will be viewed at the screen.

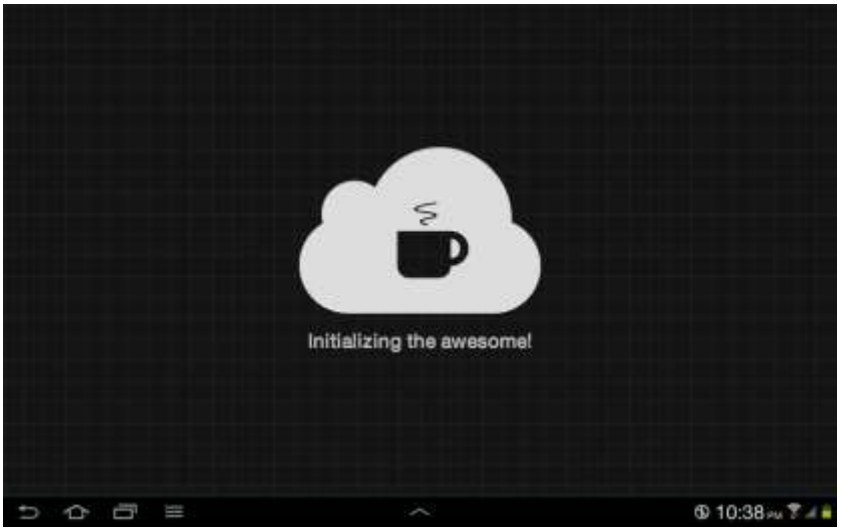

Figure 19 – Preparation for the Try Page

When the Try Page opens, user sees the page shown in figure 20.

GİYSİ VE AKSESUARLAR
DRAG THE IMAGE OF THE CLOTH THAT YOU WOULD LIKE TO TRY ON, FROM THE MENU AND DROP IT ON YOUR PICTURE
10:38

Figure 20 –Try Page

Later on, the images of the products that the user want to see how they will look on will be shown at the left section of the page shown in figure 21, and the user's photo on the right.

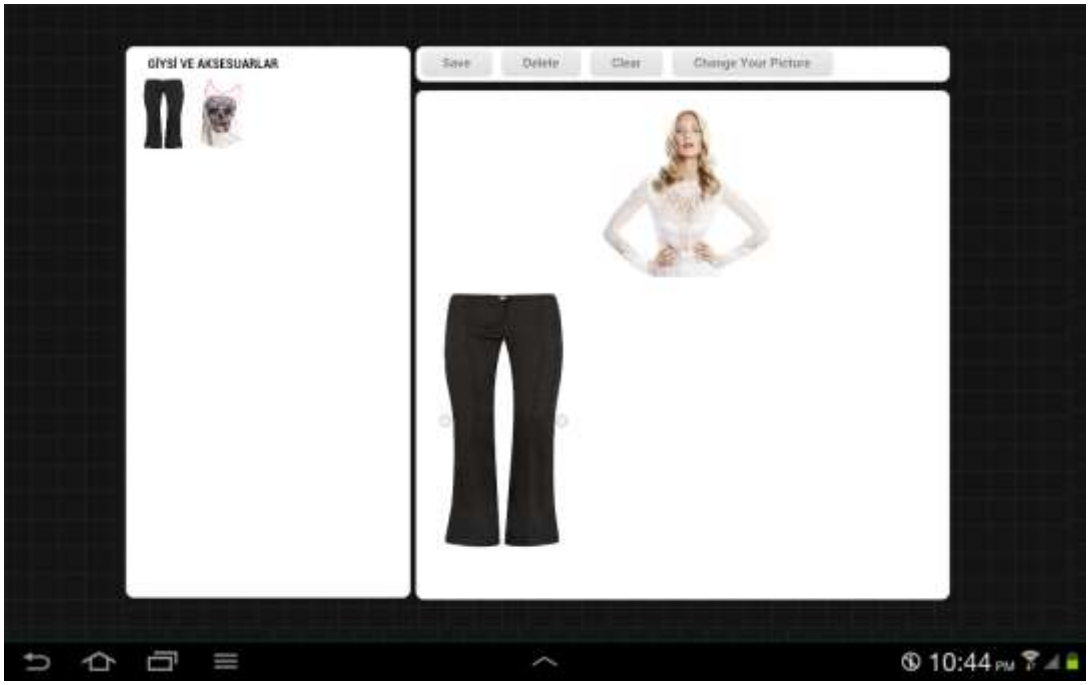

Figure 21 –Try Page Drag and Drop Product's Image

Users can drag images of the products as the way they like. Also scale the products according to their photos' sizes by the small circles placed at the left and right sides of the product's image.

After all drags, drops and re-dimensioning operations, the simulation of the trying the product is like in the figure 22 below.

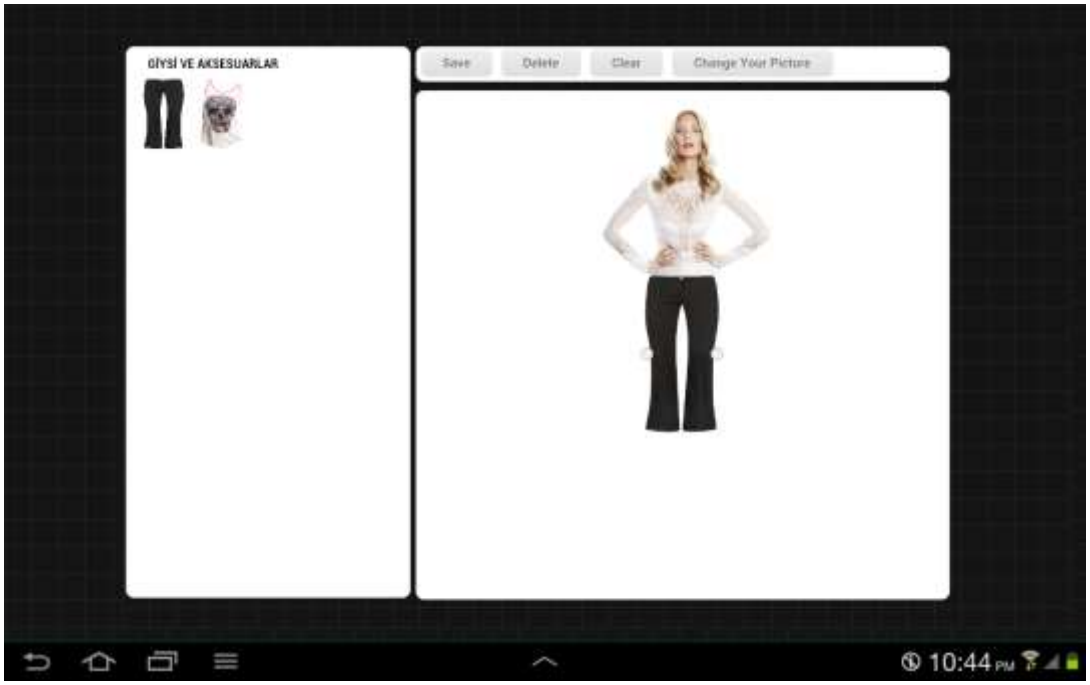

Figure 20 – Final Look of the Try Page

7.1.1.9. Sharing a Product

Users can share products that they like or have in their social network pages. In addition, they can share their wardrobes within their Vitrinn accounts. By this way, they can get their friends' opinions about the cloth.

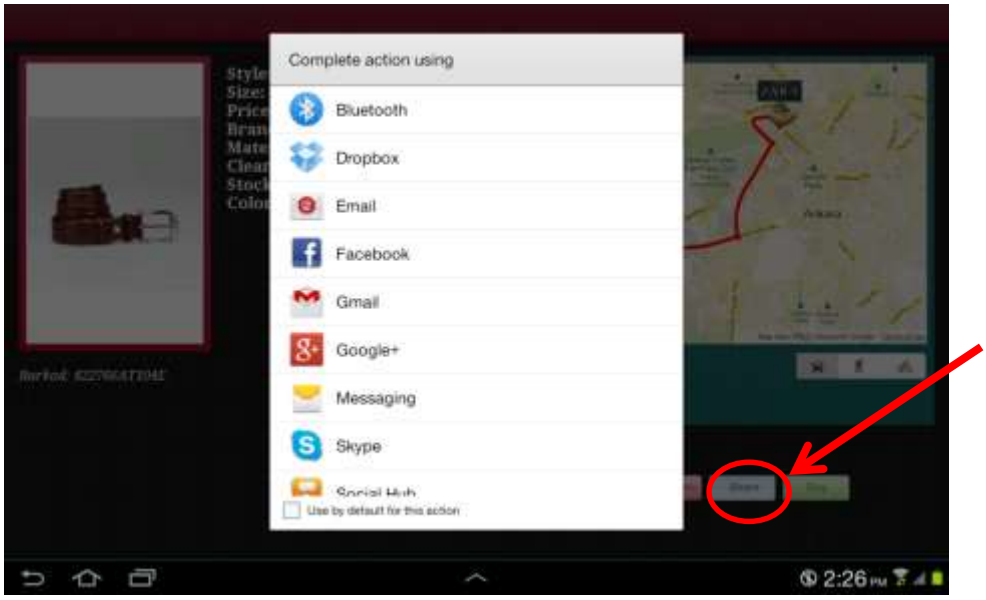

Figure 21 – Share Product

As it is shown in figure 21, after selecting **Share** button (circled in red), the sharing overlay appears. In the overlay, the possible sharing platforms are listed for the users. In order to complete sharing the product, users have to select one of the options. Also if they always want to share the product in the same platform, they have to select “Use by default for this action” check box and then whenever they click on the Share button, system automatically share the product on the platform that the user had selected as default.

7.1.1.10. Get Advice

Get advice is one of the most important features of Vitrinn. According to the taste users, estimated by the products that they liked, the products that they added to their wardrobes and the information that they share about themselves during editing their profiles, system advises products to the users.

Users can view the products that they are advised to by selecting Get Advice button located at their home pages.

Figure 22 – Get Advice Product

7.1.2. Vitrinn Android Mobile Version

Vitrinn's mobile version generally includes the same features of its tablet version. Such as mobile version does not include **Trying Page**, users are not able to see a simulation of how a cloth will look like on them when they wear it through the photo of theirs' and the clothes'. However Vitrinn's mobile version's users can directly call the store of the product's (which they wanted to buy), is sold.

7.1.2.1. Login/Signup Page

Just like the tablet version, this page (shown in figure 23) can be used by both registered and not registered users. Registered users can select login and go their home pages or do their searches. Unregistered users can select signup button and register to Vitrinn in order to benefit from features of Vitrinn as a whole

Figure 23 – Login/Signup Page

7.1.2.2. Making Searches

Both registered and unregistered users can make quick searches on the cloth they are looking for by either typing a few key words about the product or speaking the keywords into the microphone. If they prefer typing into the search bar, a smart search system completes their keywords according to the existing tags in the database. Else, if they prefer using audio search, they just have to select the microphone icon placed on the left side of the search bar and speak the keywords belonging to the cloth they are looking for into it. In order to complete their searches, users have to select the magnifying glass placed on the right side of the search bar.

Moreover if users are more specific about their clothing searches, they can select **Advance Search** button placed under the quick search's search bar, just like shown in figure 23.

7.1.2.3. Home Page of a Registered User

After selecting **Login** button, users are directed to their home pages. Through their home pages, they can view their wardrobes, the products that they had liked before, and their profiles and for getting an advice, **Get Advice** page by selecting the buttons of each. The complete view of the page is shown in figure 24.

Users can also make their searches from their home pages.

Figure 24 – Home Page

7.1.2.4. My Wardrobe Page

By clicking on **My Wardrobe** at their home pages, users are directed to the page. Users can add the clothes that they come across at the result page while viewing their searches. Seeing a cloth that they already own at the resultant products to their searches will be annoying for users. In order to prevent that problem, Vitrinn provides users to form their own wardrobes and not return the items after their searches within their wardrobes.

As it is seen in figure 25, the products that the user added to their wardrobe are presented like that.

Figure 25 – My Wardrobe Page

Users can also share their wardrobes by selecting **Share Button** under their wardrobe. Share feature will be explained more detailed in section 7.1.2.10.

The products located at user's wardrobe can be deleted by selecting the **Delete Button** placed under the user's wardrobe.

7.1.2.5. My Favorites Page

Users can add the products that they like into their favorites. The favorite products are shown to users just like in the figure 26.

Figure 26 – My Favorites Page

Users can also share the product they added to their favorites by selecting **Share Button** placed under the image of the product. Users can also delete the products in their favorites by selecting the **Delete Button** placed under the image of the product.

Favorite products of users are stored because they will be later on used during creating advices for them. Moreover, users may want to view the products that they had liked and decide to buy them.

7.1.2.6. Edit Profile Page

Users can edit their profiles through their profile pages by selecting **Edit Button** just like shown in figure 27.

Figure 27 – Edit Profile Page

Users can view their profile information that they had shared with Vitrinn at their profile pages. They can also update the information that they had shared by selecting the **Edit Button** placed at right top corner of the page. After selecting edit button, the text fields and spinners become brighter. After the updating process ends, users have to select **Save button** that is located at exactly the same as the **Edit Button**.

Furthermore, users can upload their photo or change their existing photo by tapping on the profile picture symbolized with a default profile

page icon at the left top corner of the page. They can take a new photo or choose an existing photo from their tablet's library.

Edit Profile page includes various information requests in order to analyze users' fashion style. Users have to share as possible information as they can in order to benefit from the **Get Advice** feature with a maximum efficiency.

7.1.2.7. Advanced Search Page

Advanced Search is used by the users who want to limit the search field by giving more details about the clothes that they are looking for.

Figure 28 – Advanced Search Page

As it is seen in figure 28, there are various criteria in order to help users to limit their searches. Users can also specify a price range for their advanced searches. In order to complete their searches, users again have to select the magnifying glass that symbolizes the search action.

7.1.2.8. Search Results Page

After registered and unregistered users complete their both quick and advanced searches, they will view the page shown in figure 29.

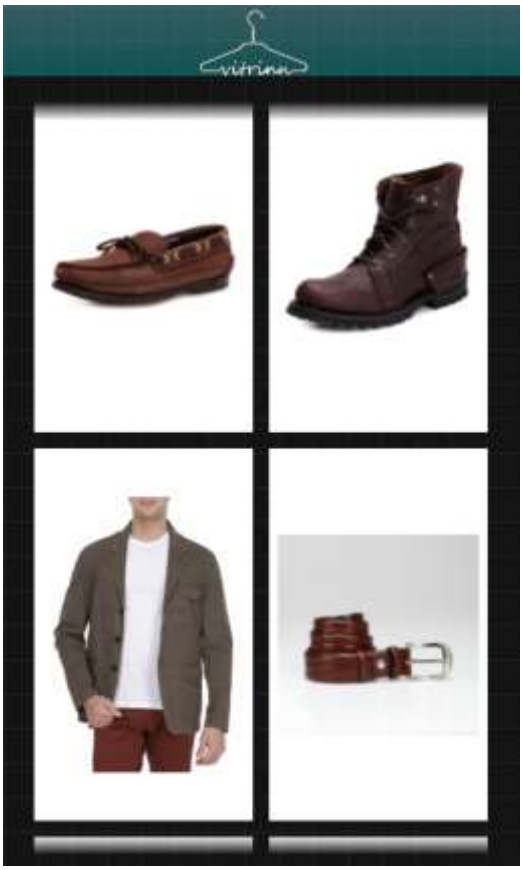

Figure 29 – Search Results Page

7.1.1.8. Detailed Product Page

After getting results to their searches, if a product attracts user's attention, user can view more information about that product by selecting the image of it. After selecting the image, the page shown in figure 30 is shown to user.

Figure 30 – Detailed Product

In figure 30, the image does not involve the Map Button, but actually at the bottom of the page there is a Map button that provides users the address description of the nearest store that the product is sold. The address description starts from users' current location just like it is shown in figure 31.

Registered users can also add the product to their wardrobes and favorite lists by selecting the **Add Wardrobe** and **Add Favorites** buttons located above the address description window.

Furthermore, both registered and unregistered users can share the product by selecting **Share** button located above the address description window.

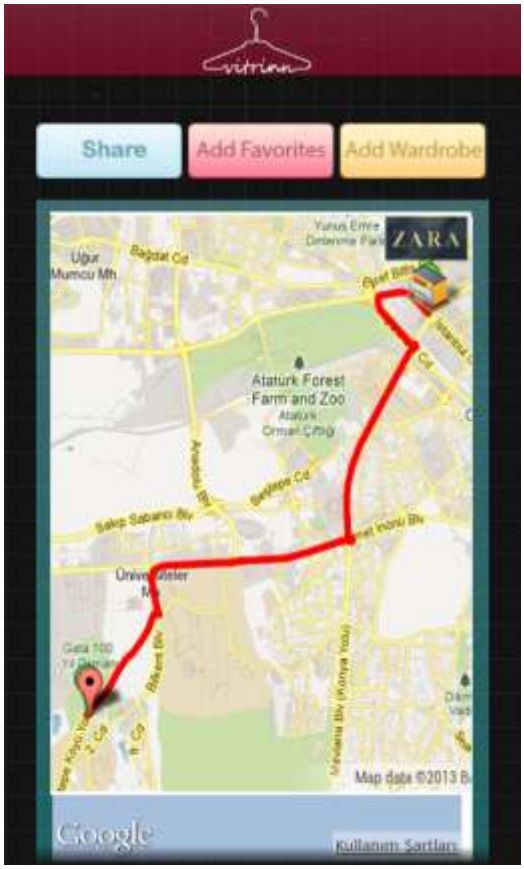

Figure 31 – Detailed Product

Vitrinn's mobile application provides users to be able to call the nearest store that the product is being sold by selecting the phone number belongs to the store, as it is shown in figure 32.

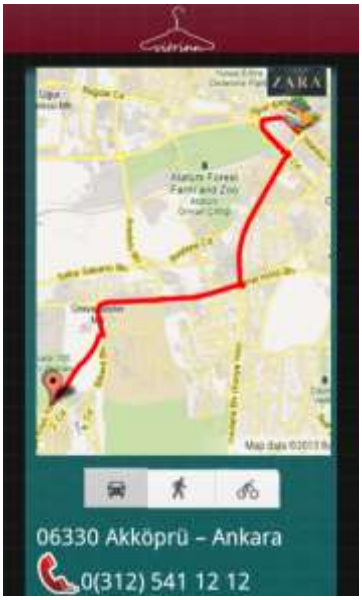

Figure 32 – Calling the Store

7.1.1.9. Get Advice Product Page

Get advice is one of the most important features of Vitrinn. According to the taste users, estimated by the products that they liked, the products that they added to their wardrobes and the information that they share about themselves during editing their profiles, system advises products to the users.

Users can view the products that they are advised to by selecting Get Advice button located at their home pages.

Figure 33 – Get Advice Page

7.1.1.10. Share Product

Users can share products that they like or have in their social network pages. In addition, they can share their wardrobes within their Vitrinn accounts. By this way, they can get their friends' opinions about the cloth.

Figure 34 – Share Product

As it is shown in figure 34, after selecting **Share** button (circled in red), the sharing overlay appears. In the overlay, the possible sharing platforms are listed for the users. In order to complete sharing the product, users have to select one of the options. Also if they always want to share the product in the same platform, they have to select “Use by default for this action” check box and then whenever they click on the Share button, system automatically share the product on the platform that the user had selected as default.

7.2. Companies’ User Manual

Vitrinn is like an intermediate communication layer between companies and customers. Instead of a concrete vitrine, Vitrinn is like a virtual vitrine. So just like stores put their models to their vitrines’, in Vitrinn, they again put them to the virtual vitrine for customers to see.

Companies can edit their store information and locations, add new stores and view their stores’ list, add and edit products and get statistics about the customer activities related to their stores and products.

7.2.1. Opening Page

vitrinn
Name Surname
Mail Address
Phone Number
Register
Mail Address
Login
VITRINN is a mobile/tablet application that offers user an easy way of shopping. We present an application which is displaying clothes depending on the user's needs and sizes from many brands' catalogs.
Home | F.A.Q. | About Us | Privacy

Figure 35 – Opening Page

Vitrinn's website for companies opens as it is shown in figure 35. If a company already a registered member of Vitrinn all they have to do is typing the mail address and password of theirs and click **Login Button**.

7.2.2. Signup Page

However if a company has not registered before, they have to share the information shown in the figure 35 and then click to **Register Button**. The registration completes with verifying the location of the store, just like shown in figure 36.

vitrinn
Harita
Finish
Mail Address
Login
VITRINN is a mobile/tablet application that offers user an easy way of shopping. We present an application which is displaying clothes depending on the user's needs and sizes from many brands' catalogs.

Figure 35 – Opening Page

8.2.3. Edit Company Profile

By clicking to **Company Info** and selecting **Edit Profile**, companies edit their profile information just like shown in figure 36.

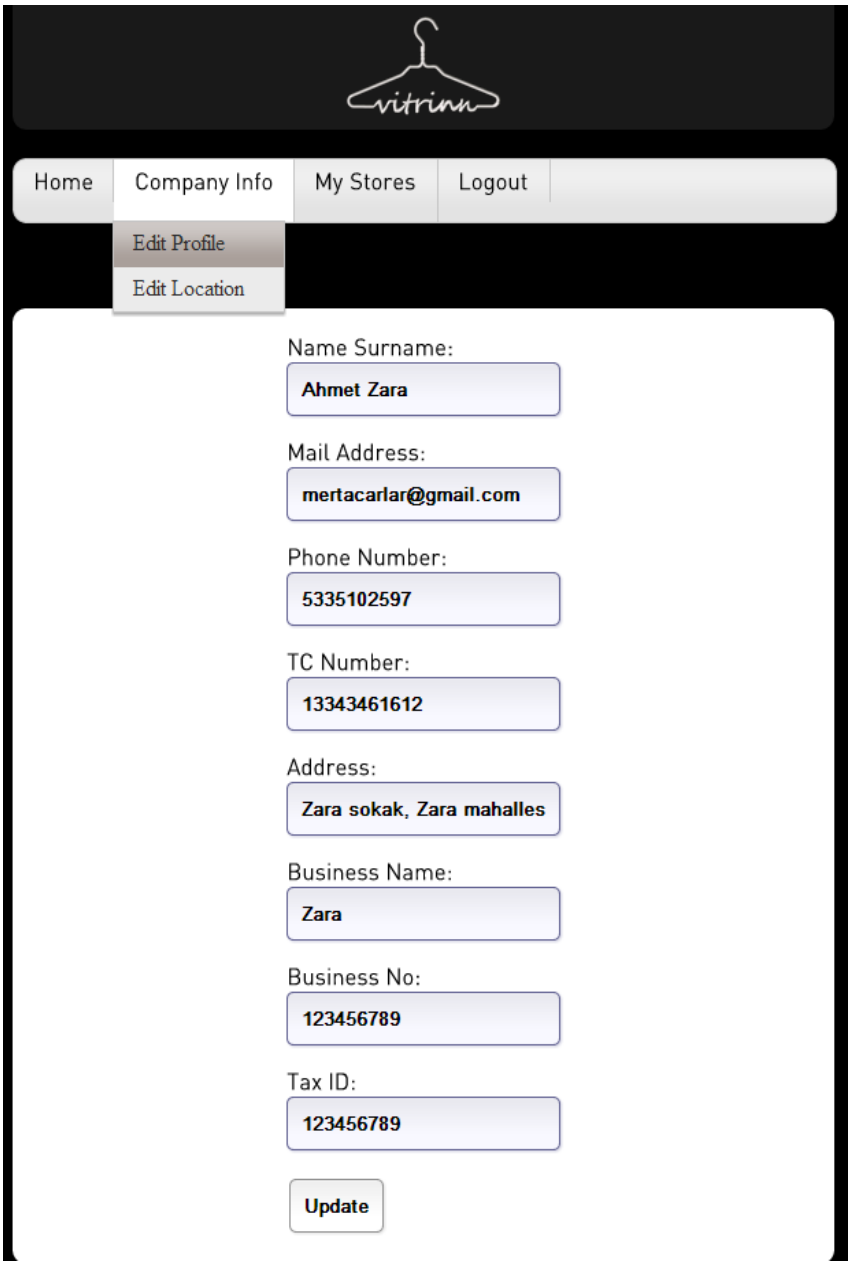

Figure 36 – Edit Profile

8.2.4. Edit Company Location

Companies can edit their stores' locations by clicking on **Company Info** button and then selecting **Edit Location** from the menu a it is shown in figure 37. They can type their address in order to pin it to the map in the address text field located under the map. Add location completed by clicking on **Save Button** under the text field.

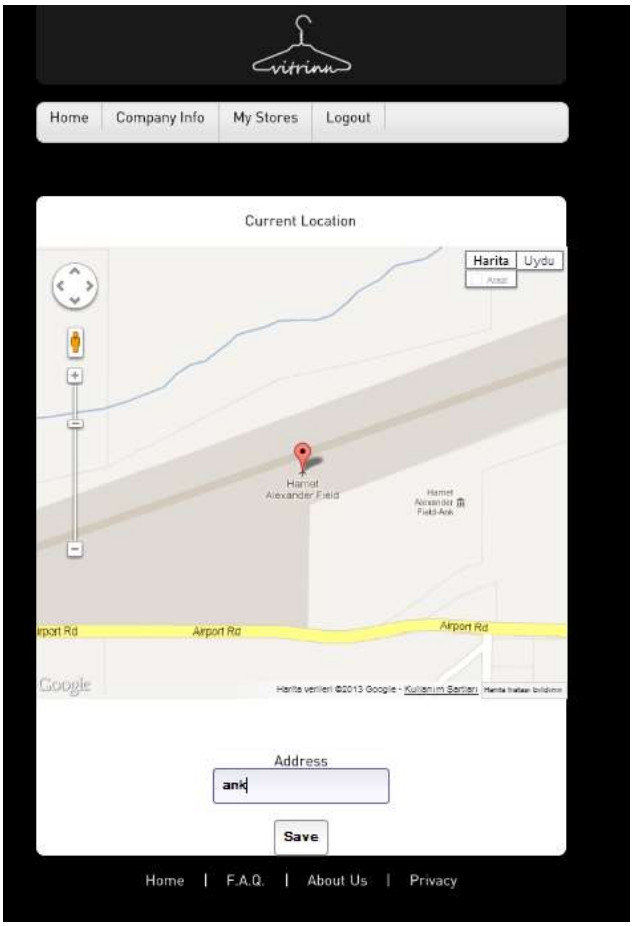

Figure 37 – Edit Location

8.2.5. Add New Store

Companies can add new store to Vitrinn by clicking on **My Stores** button and then selecting **Add New Store**, as shown in figure 38.

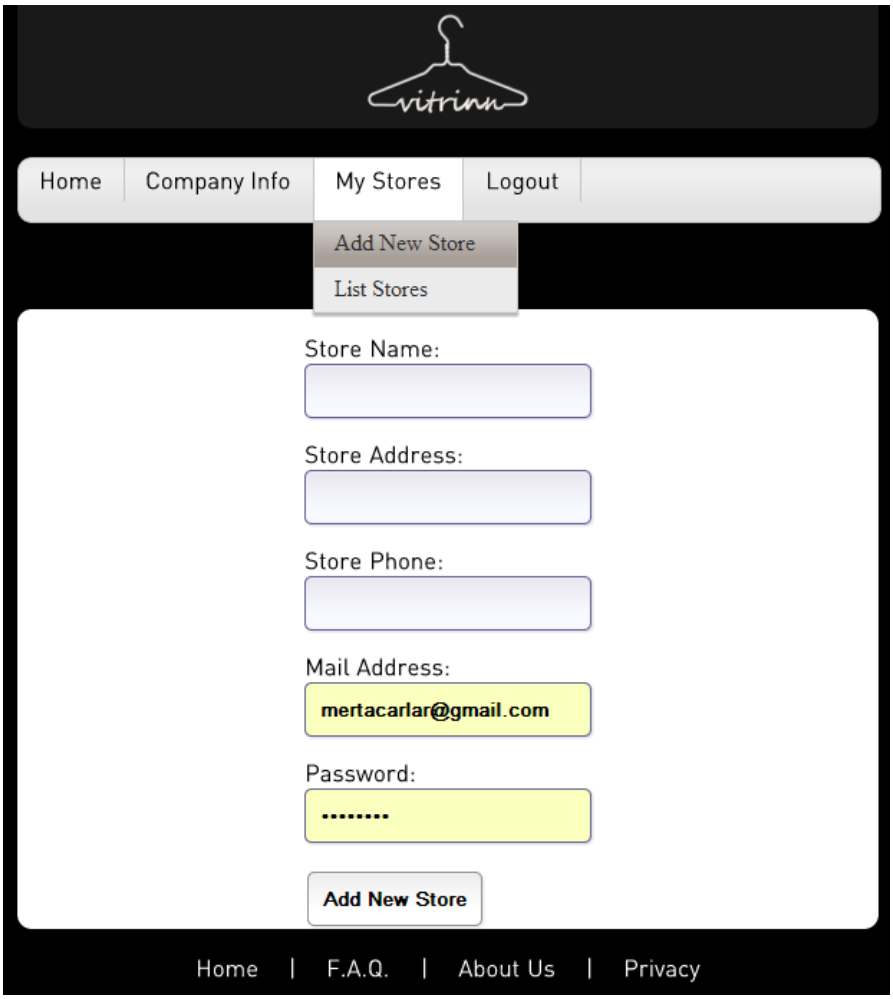

Figure 37 – Add New Store

Companies have to fill the blanks shown in figure 37 and then click on **Add New Store**.

8.2.6. List Stores

Just like adding a new store, for listing stores within them, companies have to select **List Stores** this time, as it is shown in figure 38.

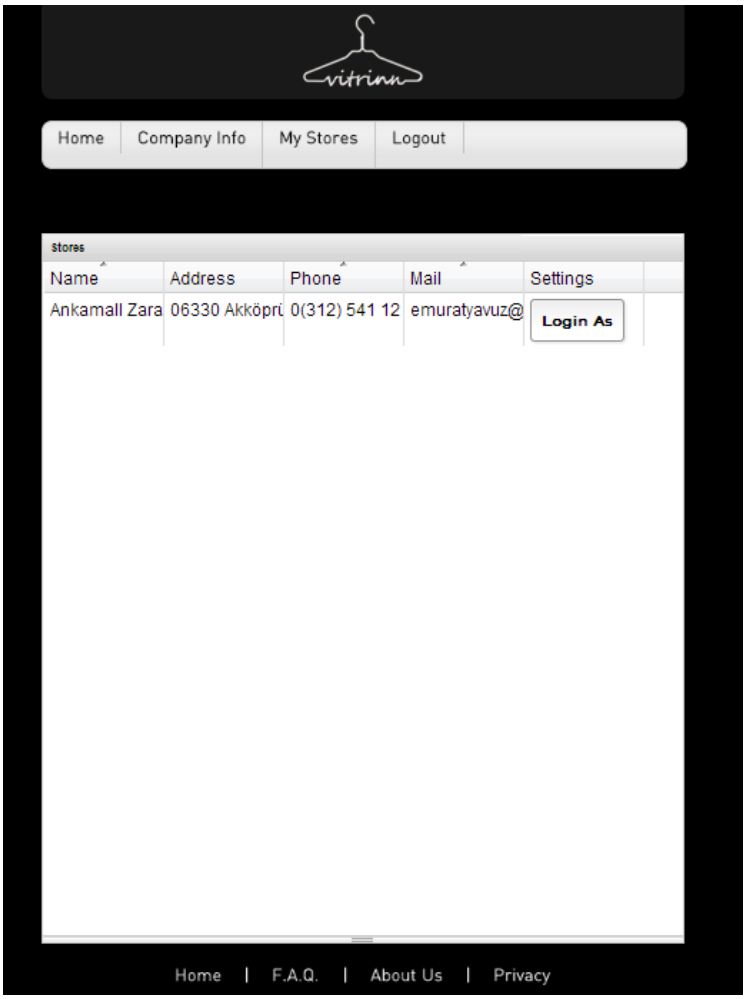

Figure 38 – List Stores

8.2.7. Login as a Store

After listing the stores of the company, stores have to find their name on the list and click on **Login As** button in order to login to the system. After logging in, user sees the page shown in figure 39.

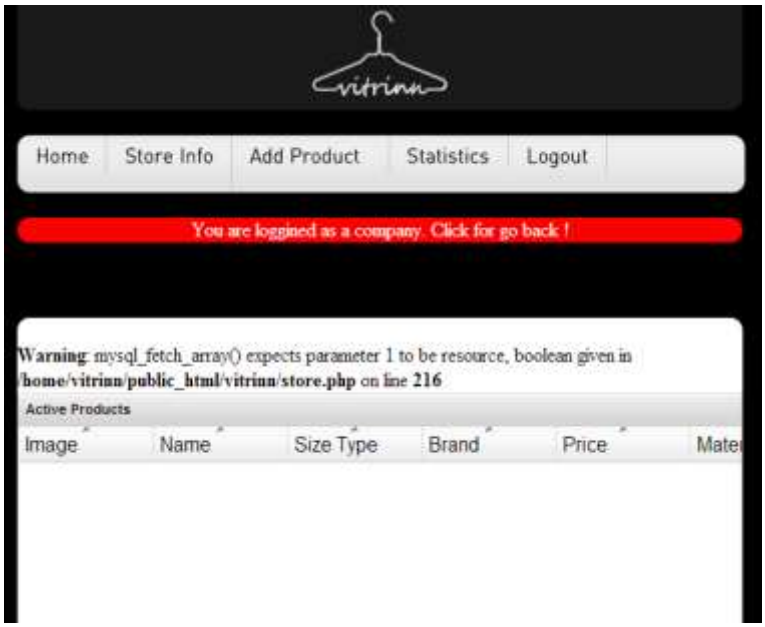

Figure 39 – Login as Company

In figure 39, as it is seen, as a company store, they can manage with their store's information (profile and location) by clicking on **Store Info** button; add products to Vitrinn's vitrine by clicking on **Add Product** button; get statistics about the activities related to their products by clicking on **Statistics** button and logout from the system by clicking on **Logout** button.

8.2.8. Add Product

Stores can add products to their Vitrinn accounts by both manual or via Excel files, as it is shown in figure 40.

Figure 40 – Add Product Options

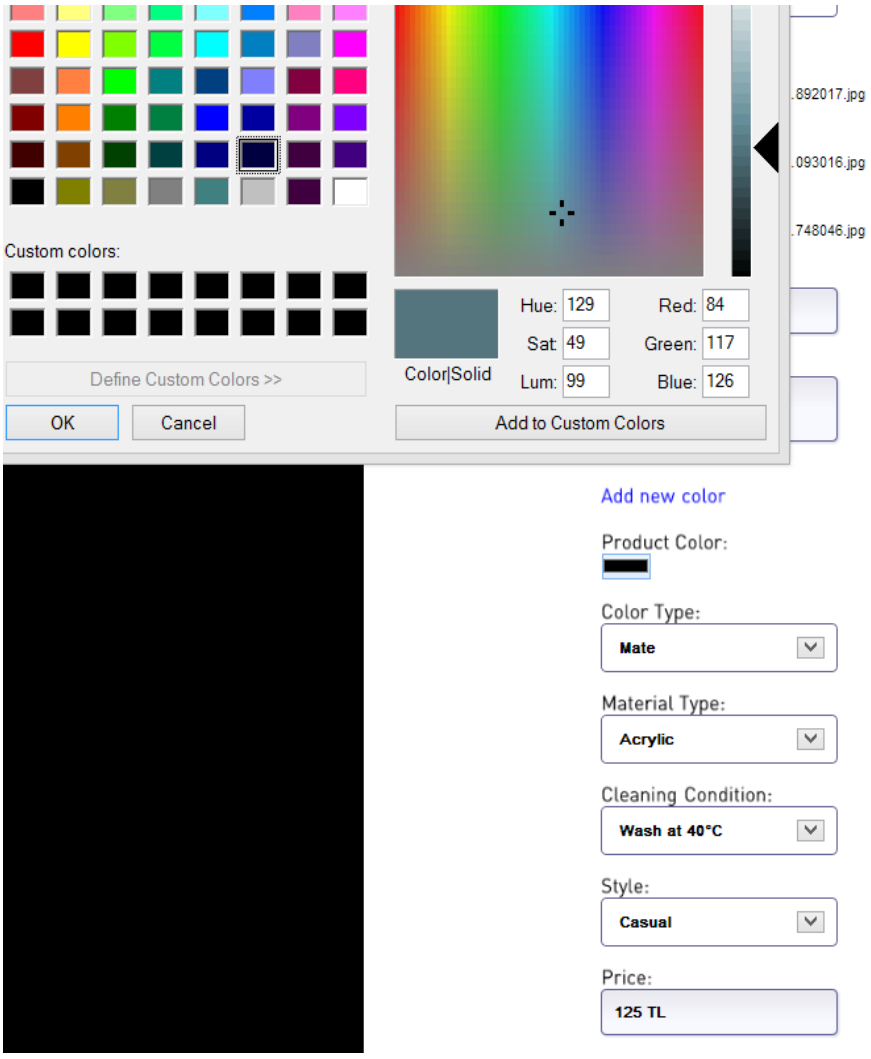

Figure 41 – Select Color

After selecting **Add Product** button and by **Manuel**, the page shown in figure 40 is shown to users. Users have to share the information about the product, product that they are going to add to company's store's account.

As the figure 41 shows, users can select the color of the product from the color picker panel.

If they prefer adding products via an excel file, they have to select **via Excel File** after clicking **Add Product**.

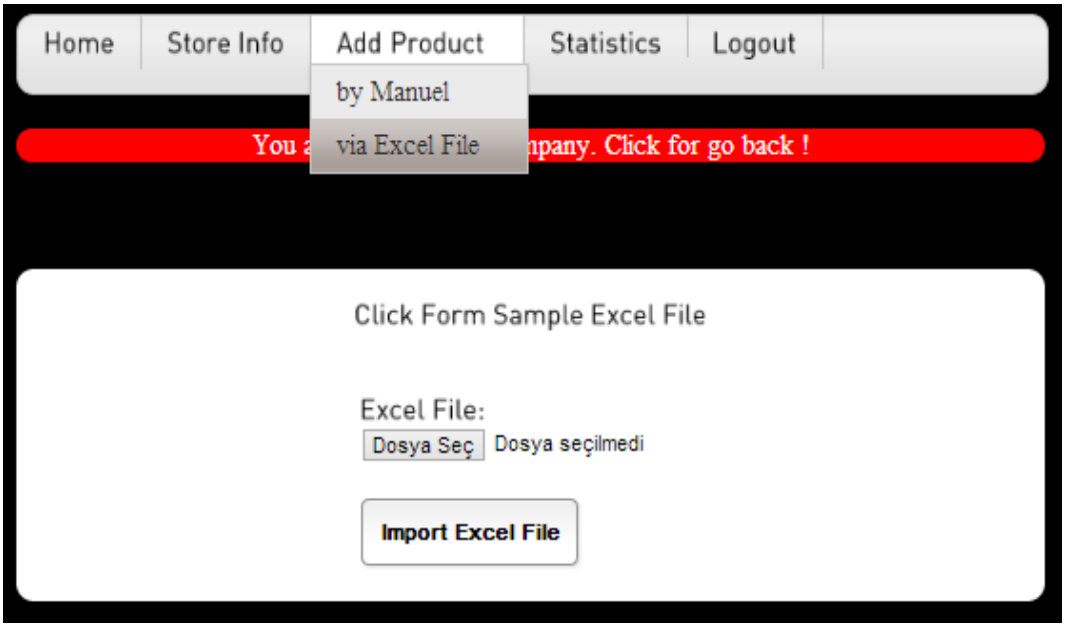

Figure 42 – Add Product via Excel File

After selecting adding product via an excel file, user will view the page shown in figure 42. All users have to do is selecting **Dosya Seç** and select the excel file from their computer and click on **Import Excel File**.

8.2.9. Statistics

Vitrinn provides the companies some statistics related to user activities related to their company and store. To get these statistics, users firstly have to click on Statistic button at their tab shown in figure 43.

Statistics that a user can get can be about statistical details or financial details. The options are placed under the menu tab.

If user selects **Statistical Details** button, users'; Product Listing, Product Detail Show, Number of Share, Number of Phone Call from Vitrinn to Store, Number of Adding to Favorites and Number of Adding to Wardrobe activities' statistics will be shown to companies and stores as a pie chart just like shown in the figure 43.

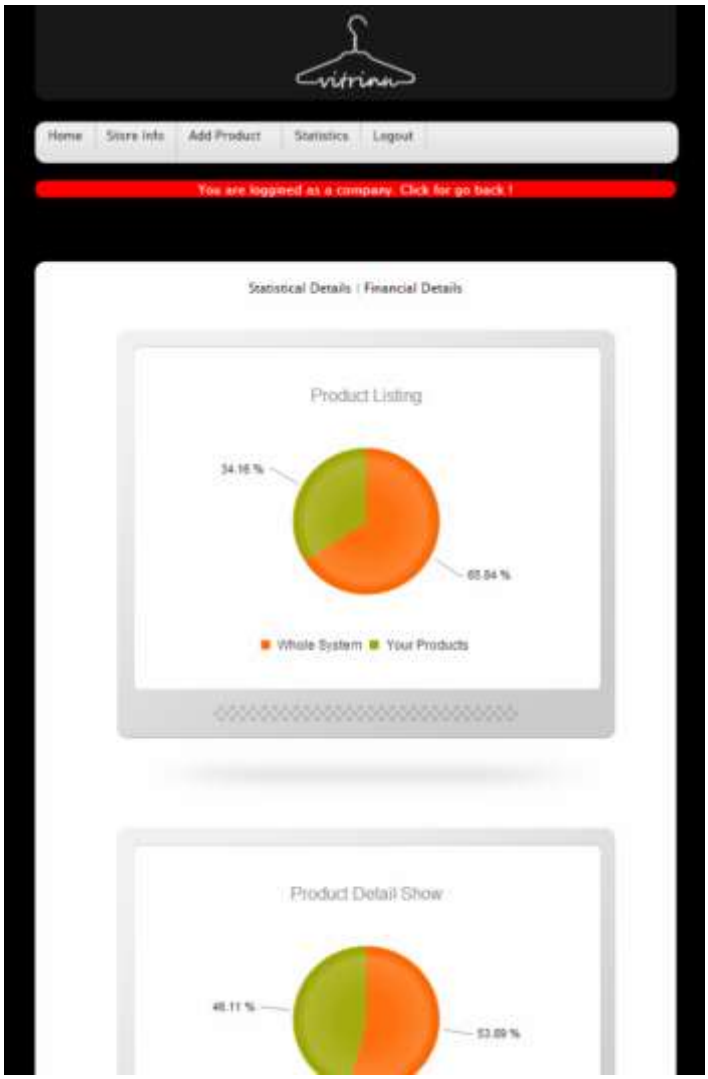

Figure 43 – Statistical Details

If user selects **Financial Details** button, the ratio stock/price of each product sold in the store will be shown, just like in figure 44.

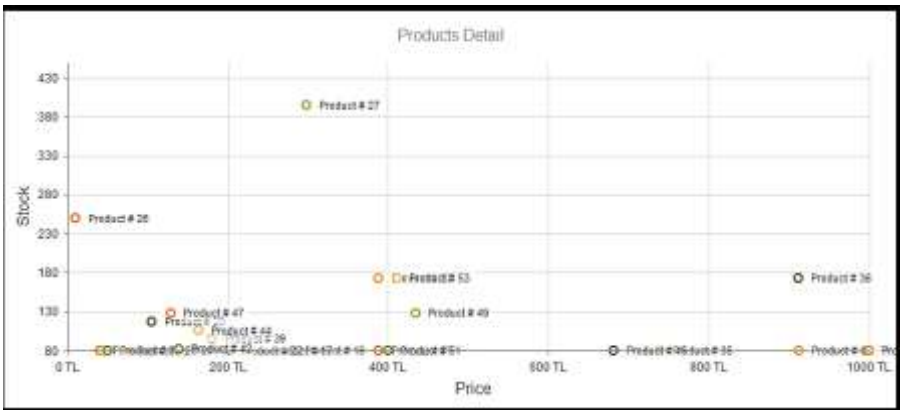

Figure 44 – Financial Details

8. CONCLUSION

In today's technology, people become more addicted to internet and so smart phones that are like an intermediate layer between them and internet. This situation also triggers the competition between application developers all around the world. So how an application can come out smelling of roses among the thousands of them? We thought a lot on how to distinguish from other applications that are similar or having the same content with ours, Vitrinn. Therefore we tried to add as many feature as possible to Vitrinn. Buy this way; we tried to increase our application's preferability. We added a get advice feature, those advices users' clothes by inspiring from their personal information, their existing clothes and the clothes that they had liked before. Other thing is after the search; users can view the clothes' location and also get the address description of from their current location. Furthermore, we added a try on feature, which enables users to see a graphical simulation by showing the picture of the model on the picture of theirs'.

To conclude, as senior design project group, we worked almost one year coordinately with each other and learned lots of new tools and technologies, practice our skills and improve our learning skills. We also learn working as a team, overcoming some obstacles together and achieving a common success. At the end of the year and the senior design project, we absolutely can say we improve ourselves in terms of application developing. We already reach as much as companies we can and meet their sales managers and directors and introduced Vitrinn. In addition we shake hands with Mudo and Altınyıldız in terms of sharing their database with us. We are determined to continue to develop Vitrinn after our graduations and make Vitrinn a widely known application.

9. REFERENCES

[1] https://code.google.com/p/android-color-picker/

[2] https://github.com/nostra13/Android-Universal-Image-Loader

[3] https://github.com/lorensiuswlt/NewQuickAction3D

[4] http://blog.stylingandroid.com/archives/888